# 1AC

### Plan Text

**The United States federal government should authorize the licensing of American companies to participate in the development of Cuba’s sugar ethanol industry and allow Cuban sugar ethanol imports.**

## Contention 1: Sugar Ethanol Shift

#### Cuban sugarcane-based ethanol market is superior to American corn-based ethanol. It will slow the rate of climate change, pesticide use, and dead zones.

Specht 13

[Jonathan-J.D. Wash. U St. Louis, Legal Advisor, “Raising Cane: Cuban Sugarcane Ethanol’s Economic and Environmental Effects on the United States,” Environmental Law & Policy Journal, Univ. of California Davis, Vol. 36:2, <http://environs.law.ucdavis.edu/issues/36/2/specht.pdf>]

IV. Environmental Effects of Ethanol¶ ¶ Assuming that Cuba is able to meet all the challenges standing in the way of creating a sugarcane-based ethanol industry, including the removal of U.S. legal barriers, and it begins importing ethanol to the United States, the United States would benefit environmentally in two ways. First, Cuban sugarcane-based ethanol would directly benefit the United States by reducing the negative environmental effects of corn-based ethanol production, to the extent to which it replaced domestically produced corn-based ethanol. n55 Second, by reducing greenhouse gas emissions, Cuban sugarcane-based ethanol would indirectly benefit the United States as well as the rest of the world by reducing the speed of global climate change. n56¶ A. Environmental Effects of Corn-Based Ethanol¶ ¶ A chief argument in favor of the domestic corn-based ethanol industry is that it is environmentally beneficial because it reduces greenhouse gas emissions. n57 Scientists, industry advocates, and critics hotly contest the degree to which greenhouse gas emissions are reduced by replacing a percentage of U.S. gasoline consumption with domestically-produced corn-based ethanol. It is beyond the scope of this Article to weigh in on which evaluation is correct. n58 [\*182] Nonetheless, the factors that go into these scientific evaluations, are important for understanding the larger picture of the ethanol issue, and thus will be discussed.¶ Using any form of ethanol as a transportation fuel combats climate change because the carbon released when ethanol is burned was captured out of the atmosphere by the plants used to make the ethanol. Contrastingly, the carbon released when gasoline is burned had been stored in the earth for millennia in the form of crude oil. n59 This simple fact is complicated by the reality that the entire process of getting ethanol into the fuel tanks of drivers - from growing crops, to creating a refined product, to delivering blended ethanol to gas stations - is reliant on fossil fuels. According to one report, "If corn growth required only photosynthesis, if ethanol were produced using solar power, if corn were instantly transported to ethanol plants, and if no land use changes were needed to grow the corn, then displacing a gallon of gasoline with ethanol would reduce greenhouse gas emissions by approximately [the equivalent of] 11.2 kilograms of [carbon dioxide]. However, fossil fuels are used to grow corn and produce ethanol." n60¶ The debit side of the domestic ethanol industry's climate-change ledger begins to subtract from the credit side before the corn it uses is even planted. "America's corn crop might look like a sustainable, solar-powered system for producing food, but it is actually a huge, inefficient, polluting machine that guzzles fossil fuel." n61 While advocates for corn production would dispute this characterization of the industry as "inefficient" and "polluting," it is undeniable that conventional corn production techniques use large amounts of climate change-exacerbating fossil fuels. Conventional (non-organic) corn production techniques involve annual applications of fertilizers and pesticides, both largely derived from fossil fuels. n62¶ The process by which incentives for ethanol production change land use patterns and thereby impact climate change, known as indirect land use change (ILUC), happens roughly as follows. n63 By increasing demand for corn, corn-based ethanol production drives up the price of corn. As the price of corn [\*183] increases, farmers want to grow more of it. By making corn more appealing to farmers to grow than other crops, and thereby increasing national levels of corn-production, the corn-based ethanol industry makes the negative environmental effects of corn production more widespread. Conventional corn-growing techniques involve applying more pesticides and fertilizers to corn than is usually applied to other row crops such as soybeans. n64 This effect is exacerbated when high corn prices disincentivize crop rotation. n65 A common technique in American agriculture today is rotating corn and soybeans. n66 Because soybeans are a nitrogen-fixing crop (that is, they take nitrogen out of the atmosphere and release it into the soil), corn grown on land that was used to grow soybeans the year before requires a lesser input of nitrogen fertilizer.¶ By boosting the price of corn relative to other crops like soybeans, however, the domestic ethanol industry encourages farmers to use the same piece of land to grow corn year after year. Growing corn on the same land in successive years rather than rotating it with soybeans significantly increases the climate change effects of corn production because "nitrogen fertilizer applications are typically fifty pounds per acre higher for corn planted after corn" and "nitrous oxide has a global warming potential more than 300 times that of [carbon dioxide]." n67 Additionally, the application of fossil fuel-derived nitrogen fertilizer has other environmental impacts beyond exacerbating climate change. The collective nitrogen runoff of the Mississippi River basin has caused a process called hypoxia, which kills off most marine life, in a region of the Gulf of Mexico. Scientists have linked the so-called Dead Zone to corn production and, thus, to the domestic ethanol industry. n68

### Scenario 1: Dead Zones

#### Dead zones collapse ocean biodiversity

Carlisle 2K

[Elizabeth Carlisle 2000 The Gulf of Mexico Dead Zone  and  Red Tides, The Louisiana Environment, http://www.tulane.edu/~bfleury/envirobio/enviroweb/DeadZone.htm]

As the fresh, nutrient-enriched water from the Mississippi and Atchafalaya Rivers spread across the Gulf waters, favorable conditions are created for the production of massive phytoplankton blooms. A bloom is defined as an “increased abundance of a species above background numbers in a specific geographic region”. Incoming nutrients stimulate growth of phytoplankton at the surface, providing food for unicellular animals. Planktonic remains and fecal matter from these organisms fall to the ocean floor, where they are eaten by bacteria, which consume excessive amounts of oxygen, creating eutrophic conditions. Hypoxic waters appear normal on the surface, but on the bottom, they are covered with dead and distressed animal, and in extreme cases, layers of stinking, sulfur-oxidizing bacteria, which cause the sediment in these areas to turn black. These hypoxic conditions cause food chain alterations, loss of biodiversity, and high aquatic species mortality.

#### Ensures planetary extinction

Craig 03

[Robin Kundis-– Associate Professor at Indiana University School of Law, “Taking Steps Toward Marine Wilderness Protection”, McGeorge Law Review, Winter, 34 McGeorge L. Rev. 155]

Biodiversity and ecosystem function arguments for conserving marine ecosystems also exist, just as they do for terrestrial ecosystems, but these arguments have thus far rarely been raised in¶ political debates. For example, besides significant tourism values - the most economically valuable ecosystem service coral reefs provide, worldwide - coral reefs protect against storms and¶ dampen other environmental fluctuations, services worth more than ten times the reefs' value for food production. 856 Waste treatment is another significant, non-extractive ecosystem function¶ that intact coral reef ecosystems provide. 857 More generally, "**ocean ecosystems play a major role in the global geochemical cycling of** all the **elements¶ that represent the basic building blocks of living organisms, carbon, nitrogen, oxygen, phosphorus, and sulfur, as well as other** less¶ abundant but **necessary elements**." 858 In a very real and direct sense, therefore, **human degradation of marine ecosystems impairs the planet's ability to support life**. Maintaining **biodiversity is** often **critical to maintaining the functions of marine ecosystems**. Current evidence shows that, in general, an ecosystem's ability to keep functioning in¶ the face of disturbance is strongly dependent on its biodiversity, "indicating that more diverse ecosystems are more stable." 859 Coral **reef ecosystems are particularly dependent on** their¶ **biodiversity.** [\*265] Most ecologists agree that the complexity of interactions and degree of interrelatedness among component species is higher on coral reefs than in any other marine¶ environment. This implies that the ecosystem functioning that produces the most highly valued components is also complex and that many otherwise insignificant species have strong effects on¶ sustaining the rest of the reef system. 860 Thus, **maintaining and restoring the biodiversity of marine ecosystems is critical to** maintaining and restoring **the ecosystem services that they¶ provide.** Non-use biodiversity values for marine ecosystems have been calculated in the wake of marine disasters, like the Exxon Valdez oil spill in Alaska. 861 Similar calculations could¶ derive preservation values for marine wilderness. However, economic value, or economic value equivalents, should not be "the sole or even primary justification for conservation of ocean¶ ecosystems. Ethical arguments also have considerable force and merit." 862 At the forefront of such arguments should be a recognition of how little we know about the sea - and about the¶ actual effect of human activities on marine ecosystems. The United States has traditionally failed to protect marine ecosystems because it was difficult to detect anthropogenic harm to the¶ oceans, but we now know that such harm is occurring - even though we are not completely sure about causation or about how to fix every problem. Ecosystems like the NWHI coral reef¶ ecosystem should inspire lawmakers and policymakers to admit that most of the time we really do not know what we are doing to the sea and hence should be preserving marine wilderness¶ whenever we can - especially when the United States has within its territory relatively pristine marine ecosystems that may be unique in the world. We may not know much about¶ the sea, but **we do know this much: if we kill the ocean we kill ourselves, and we will take most of the biosphere with us.** The Black Sea is almost¶ dead, 863 its once-complex and productive ecosystem almost entirely replaced by a monoculture of comb jellies, "starving out fish and dolphins, emptying fishermen's nets, and converting the¶ web of life into brainless, wraith-like blobs of

### Scenario 2: Monoculture

#### Domestic corn-ethanol production is the root of massive species loss and ecosystem destruction in the Great Plains

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[Jonathan-J.D. Wash. U St. Louis, Legal Advisor, “Raising Cane: Cuban Sugarcane Ethanol’s Economic and Environmental Effects on the United States,” Environmental Law & Policy Journal, Univ. of California Davis, Vol. 36:2, <http://environs.law.ucdavis.edu/issues/36/2/specht.pdf>]

Incentivizing farmers to grow consecutive corn crops instead of alternating with soybean crops is only the least damaging of the environmentally detrimental land use changes that the domestic ethanol industry encourages. Land is primarily converted to corn production in one of three ways: land that is already used to grow another crop is converted to corn production, land that is used for pasture or is enrolled in a program like the Conservation Reserve Program n69 is converted to cropland, or native habitat is plowed and converted to [\*184] cropland. n70 Each of these has varying levels of negative environmental effects. All three types of land use conversions are underway in the Great Plains states, which have ramped up corn production in response to demand from the ethanol industry. n71 While it is not the only reason corn production is increasing in these states, n72 the corn-based ethanol industry and thus the governmental policies encouraging it are clearly factors driving land use conversion. "While many factors influence land-use changes, the relationship between ethanol incentives and habitat destruction is fairly clear. Ethanol incentives increase demand for corn, which in turn increases corn prices. Increased corn prices lead to land being converted from other uses to corn production." n73¶ Converting pasture or Conservation Reserve Program Land to cropland causes more damage than changing crop rotation patterns in already cropped land. n74 Yet, the most environmentally damaging way of converting land to crop production is to plow native habitat and plant it with row crops. n75 This process is underway now in the Great Plains, with devastating environmental effects. Although the most recent data is from 2007, the USDA's census of agriculture (published every five years) provides a clear picture of the trend lines of U.S. agricultural production. This picture is one of greatly increased corn production in the Great Plains states. According to the Census of Agriculture, the number of acres of corn production in North Dakota has increased from 592,078 acres in 1997 to 991,390 acres in 2002 n76 to 2,348,171 acres in 2007, n77 representing more [\*185] than a doubling over five years and close to a quadrupling over ten years. Similarly, in South Dakota, the number of acres in corn grew from 3,165,190 in 2002 to 4,455,368 in 2007, n78 an increase of forty-one percent over five years. In Nebraska, the number of acres in corn (for grain) increased from 7,344,715 in 2002 to 9,192,656 in 2007, n79 a more modest but still significant increase of twenty-five percent over five years.¶ While a major portion of this increase in corn production in the Great Plain states is attributable to farmers converting land already used to grow other crops or pasture to corn production, n80 much of it also derives from plowing native habitat. "Recent dramatic increases in corn plantings have been heavily concentrated in the Prairie Pothole Region, displacing other crops as well as sensitive prairie pothole habitat." n81 The trend of replacing native habitat with fields of corn is an extremely worrying development, and is arguably the strongest reason for displacing at least some domestic corn-based ethanol with Cuban sugarcane-based ethanol. Therefore, this trend will be discussed in some depth.¶ Increased corn production is degrading two environmentally significant habitats in the Great Plains, grasslands and wetlands. According to The Nature Conservancy, "grasslands and prairies are the world's most imperiled ecosystem." n82 While grasslands once stretched across the entire central portion of the United States, it has lost between eighty-three and ninety-nine percent of its original tall grass prairie habitat. n83 U.S. grasslands are the native habitat of a number of threatened and endangered species, such as the greater prairie [\*186] chicken, n84 which cannot live in cornfields. n85 In addition to reducing the overall amount of habitat available to native species, the process of plowing grassland to grow crops fragments habitat by splitting it into disconnected segments. n86 The negative effects on wildlife of converting grasslands to corn fields, and thereby also fragmenting what habitat remains, are well-documented. "In counties with high corn [production] increases, the average number of grassland [bird] species was found to decline significantly from 2005 to 2008." n87¶ Furthermore, in addition to providing habitat for wildlife, grasslands act as a carbon sink, keeping centuries' worth of accumulated atmospheric carbon in underground root systems. n88 When native grassland is plowed to grow crops like corn, the carbon stored in its soil is released into the atmosphere, further exacerbating climate change and counterbalancing the greenhouse gas benefits of replacing fossil fuel-based gasoline with corn-based ethanol. n89 Taken together, the environmental costs of increasing domestic corn-based ethanol production by plowing native grasslands in the Great Plains starkly outweigh their benefits. "Plowing up our nation's last remnants of native grasslands to grow more corn for ethanol is like burning the Mona Lisa for firewood." n90¶ Along with grasslands, wetlands are the other major habitat type in the Great Plains that are being damaged by the domestic corn-based ethanol industry. The draining of wetlands to convert them to agricultural production is a practice in American agriculture that predates the domestic ethanol industry. n91 This trend has been exacerbated by a number of legal and policy factors unrelated to ethanol production (including a 2001 Supreme Court decision interpreting the [\*187] Clean Water Act). n92 To the extent that it increases demand for corn and thus the price of corn, however, the domestic ethanol industry is clearly a factor driving the conversion of wetlands to corn production. This conversion process is a land use change with wide-ranging environmental consequences. The Prairie Pothole region of the Dakotas and surrounding states - which is composed of a mixture of grasslands and wetlands - is a habitat of international significance. n93 Nearly forty percent of all species of migratory birds in North America - over 300 species - utilize this habitat at some point in their life cycles or yearly migrations. n94 The region is where "millions of ducks and geese are born each year." n95 The two greatest threats to North American ducks are the destruction of wetlands and the degradation of prairies, both of which are being driven by the expansion of U.S. corn production. n96 In addition to providing habitat for wildlife, both grasslands and wetlands help to clean up pollution and prevent flooding. n97 "Those areas with native vegetation, and the soils beneath their surface, also retain the water longer throughout the season and use up the water through evapotranspiration." n98 Thus, converting grasslands and wetlands to cropland for corn increases the risk of flooding. n99¶ Taken together, the consequences of converting grasslands and wetlands in the Great Plains to increase corn production for the domestic ethanol industry are devastating.¶ If we proceed along the current trajectory without changing federal policies [including those promoting corn-based ethanol], the prairie pothole ecosystem may be further degraded and fragmented, and the many services it provides will be impossible to restore. The region will no longer be able to support the waterfowl cherished by hunters and wildlife enthusiasts across the country. Grassland bird populations, already declining, will be unable to rebound as [\*188] nesting sites are turned into row crops. Water will become increasingly polluted and costly to clean as the grasslands and wetlands that once filtered contaminants disappear. n100

#### Monoculture model independently causes extinction

Leahy 7

[Stephen- international environmental journalist, “Biodiversity: Farming Will Make or Break the Food Chain”, Inter Press Service, 5-3-07,http://www.commondreams.org/archive/2007/05/03/945/]

"If all agricultural lands adopt the industrial, monocultural model, there will be enormous impacts on water and other essential services provided by diverse ecosystems," Jackson told IPS.¶ Societies need to recognize the value of ecosystem services and encourage farmers to use methods that benefit biodiversity, she says.¶ Biodiversity refers to the amazing variety of living things that make up the biosphere, the thin skin of life that covers the Earth and is, as far as we know, unique in the universe. The trees, plants, insects, bacteria, birds and animals that make up forest ecosystems produce oxygen, clean water, prevent erosion and flooding, and capture excess carbon dioxide, among other things.¶ "There is an unbreakable link between human health and well being and ecosystems," Walter Reid, director of the Millennium Ecosystem Assessment (MA) and a professor with the Institute for the Environment at Stanford University, told IPS last year.¶ The MA is a 22-million-dollar, four-year global research initiative commissioned by the United Nations, and carried out by 1,360 experts from 95 countries. Its mission has been to examine ways to slow or reverse the degradation of the Earth's ecosystems, including a look at what the future may be like in 2050.¶ The more species and diversity there are in an ecosystem, the more robust it is. Remove some species and it will continue to function. However, like a complex house of cards, removing key cards or too many cards results in a collapse.¶ For many ecosystems such as oceans, scientists do not know what the key cards are or how many lost species is too many.

### Scenario 3: Climate Change

#### Global Warming is happening – most recent and best evidence concludes that it is human induced

Muller 7-28-2012 [Richard, professor of physics at the University of California, Berkeley, and a former MacArthur Foundation fellow, “The Conversion of a Climate-Change Skeptic”, http://www.nytimes.com/2012/07/30/opinion/the-conversion-of-a-climate-change-skeptic.html?pagewanted=all]

CALL me a converted skeptic. Three years ago I identified problems in previous climate studies that, in my mind, threw doubt on the very existence of global warming. Last year, following an intensive research effort involving a dozen scientists, I concluded that global warming was real and that the prior estimates of the rate of warming were correct. I’m now going a step further: Humans are almost entirely the cause. My total turnaround, in such a short time, is the result of careful and objective analysis by the Berkeley Earth Surface Temperature project, which I founded with my daughter Elizabeth. Our results show that the average temperature of the earth’s land has risen by two and a half degrees Fahrenheit over the past 250 years, including an increase of one and a half degrees over the most recent 50 years. Moreover, it appears likely that essentially all of this increase results from the human emission of greenhouse gases. These findings are stronger than those of the Intergovernmental Panel on Climate Change [IPCC], the United Nations group that defines the scientific and diplomatic consensus on global warming. In its 2007 report, the I.P.C.C. concluded only that most of the warming of the prior 50 years could be attributed to humans. It was possible, according to the I.P.C.C. consensus statement, that the warming before 1956 could be because of changes in solar activity, and that even a substantial part of the more recent warming could be natural. Our Berkeley Earth approach used sophisticated statistical methods developed largely by our lead scientist, Robert Rohde, which allowed us to determine earth land temperature much further back in time. We carefully studied issues raised by skeptics: biases from urban heating (we duplicated our results using rural data alone), from data selection (prior groups selected fewer than 20 percent of the available temperature stations; we used virtually 100 percent), from poor station quality (we separately analyzed good stations and poor ones) and from human intervention and data adjustment (our work is completely automated and hands-off). In our papers we demonstrate that none of these potentially troublesome effects unduly biased our conclusions. The historic temperature pattern we observed has abrupt dips that match the emissions of known explosive volcanic eruptions; the particulates from such events reflect sunlight, make for beautiful sunsets and cool the earth’s surface for a few years. There are small, rapid variations attributable to El Niño and other ocean currents such as the Gulf Stream; because of such oscillations, the “flattening” of the recent temperature rise that some people claim is not, in our view, statistically significant. What has caused the gradual but systematic rise of two and a half degrees? We tried fitting the shape to simple math functions (exponentials, polynomials), to solar activity and even to rising functions like world population. By far the best match was to the record of atmospheric carbon dioxide (CO2), measured from atmospheric samples and air trapped in polar ice.

#### CO2 is the primary driver of climate change – outweighs all alt causes

Vertessy and Clark3-13**-**2012[Rob, Acting Director of Australian Bureau of Meteorology, and Megan, Chief Executive Officer at the Commonwealth Scientific and Industrial Research Organisation, “State of the Climate 2012”, <http://theconversation.edu.au/state-of-the-climate-2012-5831>]

Carbon dioxide (CO2) emissions account for about 60% of the effect from anthropogenic greenhouse gases on the earth’s energy balance over the past 250 years. These global CO2 emissions are mostly from fossil fuels (more than 85%), land use change, mainly associated with tropical deforestation (less than 10%), and cement production and other industrial processes (about 4%). Australia contributes about 1.3% of the global CO2 emissions. Energy generation continues to climb and is dominated by fossil fuels – suggesting emissions will grow for some time yet. CO2 levels are rising in the atmosphere and ocean. About 50% of the amount of CO2 emitted from fossil fuels, industry, and changes in land-use, stays in the atmosphere. The remainder is taken up by the ocean and land vegetation, in roughly equal parts. The extra carbon dioxide absorbed by the oceans is estimated to have caused about a 30% increase in the level of ocean acidity since pre-industrial times. The sources of the CO2 increase in the atmosphere can be identified from studies of the isotopic composition of atmospheric CO2 and from oxygen (O2) concentration trends in the atmosphere. The observed trends in the isotopic (13C, 14C) composition of CO2 in the atmosphere and the decrease in the concentration of atmospheric O2 confirm that the dominant cause of the observed CO2 increase is the combustion of fossil fuels.

#### Global warming makes global agricultural production impossible – resulting in mass starvation

Potsdam Institute, 2012 (Potsdam Institute for Climate Impact Research and Climate Analytics, “Turn Down the Heat: Why a 4°C Warmer World Must be Avoided”, A report for the World Bank, November, http://climatechange.worldbank.org/sites/default/files/Turn\_Down\_the\_heat\_Why\_a\_4\_degree\_centrigrade\_warmer\_world\_must\_be\_avoided.pdf)

The overall conclusions of IPCC AR4 concerning food production and agriculture included the following: • Crop productivity is projected to increase slightly at mid- to high latitudes for local mean temperature increases of up to 1 to 3°C depending on the crop, and then decrease beyond that in some regions (medium confidence) {WGII 5.4, SPM}. • At lower latitudes, especially in seasonally dry and tropical regions, crop productivity is projected to decrease for even small local temperature increases (1 to 2°C) which would increase the risk of hunger (medium confidence) {WGII 5.4, SPM}. • Globally, the potential for food production is projected to increase with increases in local average temperature over a range of 1 to 3°C, but above this it is projected to decrease (medium confidence) {WGII 5.4, 5.5, SPM}. These findings clearly indicate a growing risk for low-latitude regions at quite low levels of temperature increase and a growing risk for systemic global problems above a warming of a few degrees Celsius. While a comprehensive review of literature is forthcoming in the IPCC AR5, the snapshot overview of recent scientific literature provided here illustrates that the concerns identified in the AR4 are confirmed by recent literature and in important cases extended. In particular, impacts of extreme heat waves deserve mention here for observed agricultural impacts (see also Chapter 2). This chapter will focus on the latest findings regarding possible limits and risks to large-scale agriculture production because of climate change, summarizing recent studies relevant to this risk assessment, including at high levels of global warming approaching 4°C. In particular, it will deliberately highlight important findings that point to the risks of assuming a forward projection of historical trends. Projections for food and agriculture over the 21st century indicate substantial challenges irrespective of climate change. As early as 2050, the world’s population is expected to reach about 9 billion people (Lutz and Samir 2010) and demand for food is expected to increase accordingly. Based on the observed relationship between per capita GDP and per capita demand for crop calories (human consumption, feed crops, fish production and losses during food production), Tilman et al. (2011) project a global increase in the demand for crops by about 100 percent from 2005 to 2050. Other estimates for the same period project a 70 percent increase of demand (Alexandratos 2009). Several projections suggest that global cereal and livestock production may need to increase by between 60 and 100 percent to 2050, depending on the warming scenario (Thornton et al. 2011). The historical context can on the one hand provide reassurance that despite growing population, food production has been able to increase to keep pace with demand and that despite occasional fluctuations, food prices generally stabilize or decrease in real terms (Godfray, Crute, et al. 2010). Increases in food production have mainly been driven by more efficient use of land, rather than by the extension of arable land, with the former more widespread in rich countries and the latter tending to be practiced in poor countries (Tilman et al. 2011). While grain production has more than doubled, the area of land used for arable agriculture has only increased by approximately 9 percent (Godfray, Beddington, et al. 2010). However, although the expansion of agricultural production has proved possible through technological innovation and improved water-use efficiency, observation and analysis point to a significant level of vulnerability of food production and prices to the consequences of climate change, extreme weather, and underlying social and economic development trends. There are some indications that climate change may reduce arable land in low-latitude regions, with reductions most pronounced in Africa, Latin America, and India (Zhang and Cai 2011). For example, flooding of agricultural land is also expected to severely impact crop yields in the future: 10.7 percent of South Asia´s agricultural land is projected to be exposed to inundation, accompanied by a 10 percent intensification of storm surges, with 1 m sea-level rise (Lange et al. 2010). Given the competition for land that may be used for other human activities (for example, urbanization and biofuel production), which can be expected to increase as climate change places pressure on scarce resources, it is likely that the main increase in production will have to be managed by an intensification of agriculture on the same—or possibly even reduced—amount of land (Godfray, Beddington et al. 2010; Smith et al. 2010). Declines in nutrient availability (for example, phosphorus), as well as the spread in pests and weeds, could further limit the increase of agricultural productivity. Geographical shifts in production patterns resulting from the effects of global warming could further escalate distributional issues in the future. While this will not be taken into consideration here, it illustrates the plethora of factors to take into account when thinking of challenges to promoting food security in a warming world. New results published since 2007 point to a more rapidly escalating risk of crop yield reductions associated with warming than previously predicted (Schlenker and Lobell 2010; Schlenker and Roberts 2009). In the period since 1980, patterns of global crop production have presented significant indications of an adverse effect resulting from climate trends and variability, with maize declining by 3.8 percent and wheat production by 5.5 percent compared to a case without climate trends. A significant portion of increases in crop yields from technology, CO2 fertilization, and other changes may have been offset by climate trends in some countries (Lobell et al. 2011). This indication alone casts some doubt on future projections based on earlier crop models. In relation to the projected effects of climate change three interrelated factors are important: temperature-induced effect, precipitation-induced effect, and the CO2 -fertilization effect. The following discussion will focus only on these biophysical factors. Other factors that can damage crops, for example, the elevated levels of tropospheric ozone (van Groenigen et al. 2012), fall outside the scope of this report and will not be addressed. Largely beyond the scope of this report are the far-reaching and uneven adverse implications for poverty in many regions arising from the macroeconomic consequences of shocks to global agricultural production from climate change. It is necessary to stress here that even where overall food production is not reduced or is even increased with low levels of warming, distributional issues mean that food security will remain a precarious matter or worsen as different regions are impacted differently and food security is further challenged by a multitude of nonclimatic factors.

#### 4 degrees of warming make sustaining biodiversity impossible – the impact is extinction

Potsdam Institute, 2012 (Potsdam Institute for Climate Impact Research and Climate Analytics, “Turn Down the Heat: Why a 4°C Warmer World Must be Avoided”, A report for the World Bank, November, http://climatechange.worldbank.org/sites/default/files/Turn\_Down\_the\_heat\_Why\_a\_4\_degree\_centrigrade\_warmer\_world\_must\_be\_avoided.pdf)

Ecosystems and their species provide a range of important goods and services for human society. These include water, food, cultural and other values. In the AR4 an assessment of climate change effects on ecosystems and their services found the following: • If greenhouse gas emissions and other stresses continue at or above current rates, the resilience of many ecosystems is likely to be exceeded by an unprecedented combination of change in climate, associated disturbances (for example, flooding, drought, wildfire, insects, and ocean acidification) and other stressors (global change drivers) including land use change, pollution and over-exploitation of resources. • Approximately 20 to 30 percent of plant and animal species assessed so far are likely to be at increased risk of extinction, if increases in global average temperature exceed of 2–3° above preindustrial levels. • For increases in global average temperature exceeding 2 to 3° above preindustrial levels and in concomitant atmospheric CO2 concentrations, major changes are projected in ecosystem structure and function, species’ ecological interactions and shifts in species’ geographical ranges, with predominantly negative consequences for biodiversity and ecosystem goods and services, such as water and food supply. It is known that past large-scale losses of global ecosystems and species extinctions have been associated with rapid climate change combined with other ecological stressors. Loss and/or degradation of ecosystems, and rates of extinction because of human pressures over the last century or more, which have intensified in recent decades, have contributed to a very high rate of extinction by geological standards. It is well established that loss or degradation of ecosystem services occurs as a consequence of species extinctions, declining species abundance, or widespread shifts in species and biome distributions (Leadley et al. 2010). Climate change is projected to exacerbate the situation. This section outlines the likely consequences for some key ecosystems and for biodiversity. The literature tends to confirm the conclusions from the AR4 outlined above. Despite the existence of detailed and highly informative case studies, upon which this section will draw, it is also important to recall that there remain many uncertainties (Bellard, Bertelsmeier, Leadley, Thuiller, and Courchamp, 2012). However, threshold behavior is known to occur in biological systems (Barnosky et al. 2012) and most model projections agree on major adverse consequences for biodiversity in a 4°C world (Bellard et al., 2012). With high levels of warming, coalescing human induced stresses on ecosystems have the potential to trigger large-scale ecosystem collapse (Barnosky et al. 2012). Furthermore, while uncertainty remains in the projections, there is a risk not only of major loss of valuable ecosystem services, particularly to the poor and the most vulnerable who depend on them, but also of feedbacks being initiated that would result in ever higher CO2 emissions and thus rates of global warming. Significant effects of climate change are already expected for warming well below 4°C. In a scenario of 2.5°C warming, severe ecosystem change, based on absolute and relative changes in carbon and water fluxes and stores, cannot be ruled out on any continent (Heyder, Schaphoff, Gerten, & Lucht, 2011). If warming is limited to less than 2°C, with constant or slightly declining precipitation, small biome shifts are projected, and then only in temperate and tropical regions. Considerable change is projected for cold and tropical climates already at 3°C of warming. At greater than 4°C of warming, biomes in temperate zones will also be substantially affected. These changes would impact not only the human and animal communities that directly rely on the ecosystems, but would also exact a cost (economic and otherwise) on society as a whole, ranging from extensive loss of biodiversity and diminished land cover, through to loss of ecosystems services such as fisheries and forestry (de Groot et al., 2012; Farley et al., 2012). Ecosystems have been found to be particularly sensitive to geographical patterns of climate change (Gonzalez, Neilson, Lenihan, and Drapek, 2010). Moreover, ecosystems are affected not only by local changes in the mean temperature and precipitation, along with changes in the variability of these quantities and changes by the occurrence of extreme events. These climatic variables are thus decisive factors in determining plant structure and ecosystem composition (Reu et al., 2011). Increasing vulnerability to heat and drought stress will likely lead to increased mortality and species extinction. For example, temperature extremes have already been held responsible for mortality in Australian flying-fox species (Welbergen, Klose, Markus, and Eby 2008), and interactions between phenological changes driven by gradual climate changes and extreme events can lead to reduced fecundity (Campbell et al. 2009; Inouye, 2008). Climate change also has the potential to facilitate the spread and establishment of invasive species (pests and weeds) (Hellmann, Byers, Bierwagen, & Dukes, 2008; Rahel & Olden, 2008) with often detrimental implications for ecosystem services and biodiversity. Human land-use changes are expected to further exacerbate climate change driven ecosystem changes, particularly in the tropics, where rising temperatures and reduced precipitation are expected to have major impacts (Campbell et al., 2009; Lee & Jetz, 2008). Ecosystems will be affected by the increased occurrence of extremes such as forest loss resulting from droughts and wildfire exacerbated by land use and agricultural expansion (Fischlin et al., 2007). Climate change also has the potential to catalyze rapid shifts in ecosystems such as sudden forest loss or regional loss of agricultural productivity resulting from desertification (Barnosky et al., 2012). The predicted increase in extreme climate events would also drive dramatic ecosystem changes (Thibault and Brown 2008; Wernberg, Smale, and Thomsen 2012). One such extreme event that is expected to have immediate impacts on ecosystems is the increased rate of wildfire occurrence. Climate change induced shifts in the fire regime are therefore in turn powerful drivers of biome shifts, potentially resulting in considerable changes in carbon fluxes over large areas (Heyder et al., 2011; Lavorel et al., 2006) It is anticipated that global warming will lead to global biome shifts (Barnosky et al. 2012). Based on 20th century observations and 21st century projections, poleward latitudinal biome shifts of up to 400 km are possible in a 4° C world (Gonzalez et al., 2010). In the case of mountaintop ecosystems, for example, such a shift is not necessarily possible, putting them at particular risk of extinction (La Sorte and Jetz, 2010). Species that dwell at the upper edge of continents or on islands would face a similar impediment to adaptation, since migration into adjacent ecosystems is not possible (Campbell, et al. 2009; Hof, Levinsky, Araújo, and Rahbek 2011). The consequences of such geographical shifts, driven by climatic changes as well as rising CO2 concentrations, would be found in both reduced species richness and species turnover (for example, Phillips et al., 2008; White and Beissinger 2008). A study by (Midgley and Thuiller, 2011) found that, of 5,197 African plant species studied, 25–42 percent could lose all suitable range by 2085. It should be emphasized that competition for space with human agriculture over the coming century is likely to prevent vegetation expansion in most cases (Zelazowski et al., 2011) Species composition changes can lead to structural changes of the entire ecosystem, such as the increase in lianas in tropical and temperate forests (Phillips et al., 2008), and the encroachment of woody plants in temperate grasslands (Bloor et al., 2008, Ratajczak et al., 2012), putting grass-eating herbivores at risk of extinction because of a lack of food available—this is just one example of the sensitive intricacies of ecosystem responses to external perturbations. There is also an increased risk of extinction for herbivores in regions of drought-induced tree dieback, owing to their inability to digest the newly resident C4 grasses (Morgan et al., 2008). The following provides some examples of ecosystems that have been identified as particularly vulnerable to climate change. The discussion is restricted to ecosystems themselves, rather than the important and often extensive impacts on ecosystems services. Boreal-temperate ecosystems are particularly vulnerable to climate change, although there are large differences in projections, depending on the future climate model and emission pathway studied. Nevertheless there is a clear risk of large-scale forest dieback in the boreal-temperate system because of heat and drought (Heyder et al., 2011). Heat and drought related die-back has already been observed in substantial areas of North American boreal forests (Allen et al., 2010), characteristic of vulnerability to heat and drought stress leading to increased mortality at the trailing edge of boreal forests. The vulnerability of transition zones between boreal and temperate forests, as well as between boreal forests and polar/tundra biomes, is corroborated by studies of changes in plant functional richness with climate change (Reu et al., 2011), as well as analyses using multiple dynamic global vegetation models (Gonzalez et al., 2010). Subtle changes within forest types also pose a great risk to biodiversity as different plant types gain dominance (Scholze et al., 2006). Humid tropical forests also show increasing risk of major climate induced losses. At 4°C warming above pre-industrial levels, the land extent of humid tropical forest, characterized by tree species diversity and biomass density, is expected to contract to approximately 25 percent of its original size [see Figure 3 in (Zelazowski et al., 2011)], while at 2°C warming, more than 75 percent of the original land can likely be preserved. For these ecosystems, water availability is the dominant determinant of climate suitability (Zelazowski et al., 2011). In general, Asia is substantially less at risk of forest loss than the tropical Americas. However, even at 2°C, the forest in the Indochina peninsula will be at risk of die-back. At 4°C, the area of concern grows to include central Sumatra, Sulawesi, India and the Philippines, where up to 30 percent of the total humid tropical forest niche could be threatened by forest retreat (Zelazowski et al., 2011). There has been substantial scientific debate over the risk of a rapid and abrupt change to a much drier savanna or grassland ecosystem under global warming. This risk has been identified as a possible planetary tipping point at around a warming of 3.5–4.5°C, which, if crossed, would result in a major loss of biodiversity, ecosystem services and the loss of a major terrestrial carbon sink, increasing atmospheric CO2 concentrations (Lenton et al., 2008)(Cox, et al., 2004) (Kriegler, Hall, Held, Dawson, and Schellnhuber, 2009). Substantial uncertainty remains around the likelihood, timing and onset of such risk due to a range of factors including uncertainty in precipitation changes, effects of CO2 concentration increase on water use efficiency and the CO2 fertilization effect, land-use feedbacks and interactions with fire frequency and intensity, and effects of higher temperature on tropical tree species and on important ecosystem services such as pollinators. While climate model projections for the Amazon, and in particular precipitation, remain quite uncertain recent analyses using IPCC AR4 generation climate indicates a reduced risk of a major basin wide loss of precipitation compared to some earlier work. If drying occurs then the likelihood of an abrupt shift to a drier, less biodiverse ecosystem would increase. Current projections indicate that fire occurrence in the Amazon could double by 2050, based on the A2 SRES scenario that involves warming of approximately 1.5°C above pre-industrial levels (Silvestrini et al., 2011), and can therefore be expected to be even higher in a 4°C world. Interactions of climate change, land use and agricultural expansion increase the incidence of fire (Aragão et al., 2008), which plays a major role in the (re)structuring of vegetation (Gonzalez et al., 2010; Scholze et al., 2006). A decrease in precipitation over the Amazon forests may therefore result in forest retreat or transition into a low biomass forest (Malhi et al., 2009). Moderating this risk is a possible increase in ecosystem water use efficiency with increasing CO2 concentrations is accounted for, more than 90 percent of the original humid tropical forest niche in Amazonia is likely to be preserved in the 2°C case, compared to just under half in the 4°C warming case (see Figure 5 in Zelazowski et al., 2011) (Cook, Zeng, and Yoon, 2012; Salazar & Nobre, 2010). Recent work has analyzed a number of these factors and their uncertainties and finds that the risk of major loss of forest due to climate is more likely to be regional than Amazon basin-wide, with the eastern and southeastern Amazon being most at risk (Zelazowski et al., 2011). Salazar and Nobre (2010) estimates a transition from tropical forests to seasonal forest or savanna in the eastern Amazon could occur at warming at warming of 2.5–3.5°C when CO2 fertilization is not considered and 4.5–5.5°C when it is considered. It is important to note, as Salazar and Nobre (2010) point out, that the effects of deforestation and increased fire risk interact with the climate change and are likely to accelerate a transition from tropical forests to drier ecosystems. Increased CO2 concentration may also lead to increased plant water efficiency (Ainsworth and Long, 2005), lowering the risk of plant die-back, and resulting in vegetation expansion in many regions, such as the Congo basin, West Africa and Madagascar (Zelazowski et al., 2011), in addition to some dry-land ecosystems (Heyder et al., 2011). The impact of CO2 induced ‘greening’ would, however, negatively affect biodiversity in many ecosystems. In particular encroachment of woody plants into grasslands and savannahs in North American grassland and savanna communities could lead to a decline of up to 45 percent in species richness ((Ratajczak and Nippert, 2012) and loss of specialist savanna plant species in southern Africa (Parr, Gray, and Bond, 2012). Mangroves are an important ecosystem and are particularly vulnerable to the multiple impacts of climate change, such as: rise in sea levels, increases in atmospheric CO2 concentration, air and water temperature, and changes in precipitation patterns. Sea-level rise can cause a loss of mangroves by cutting off the flow of fresh water and nutrients and drowning the roots (Dasgupta, Laplante et al. 2010). By the end of the 21st century, global mangrove cover is projected to experience a significant decline because of heat stress and sea-level rise (Alongi, 2008; Beaumont et al., 2011). In fact, it has been estimated that under the A1B emissions scenario (3.5°C relative to pre-industrial levels) mangroves would need to geographically move on average about 1 km/year to remain in suitable climate zones (Loarie et al., 2009). The most vulnerable mangrove forests are those occupying low-relief islands such as small islands in the Pacific where sea-level rise is a dominant factor. Where rivers are lacking and/ or land is subsiding, vulnerability is also high. With mangrove losses resulting from deforestation presently at 1 to 2 percent per annum (Beaumont et al., 2011), climate change may not be the biggest immediate threat to the future of mangroves. However if conservation efforts are successful in the longer term climate change may become a determining issue (Beaumont et al., 2011). Coral reefs are acutely sensitive to changes in water temperatures, ocean pH and intensity and frequency of tropical cyclones. Mass coral bleaching is caused by ocean warming and ocean acidification, which results from absorption of CO2 (for example, Frieler et al., 2012a). Increased sea-surface temperatures and a reduction of available carbonates are also understood to be driving causes of decreased rates of calcification, a critical reef-building process (De’ath, Lough, and Fabricius, 2009). The effects of climate change on coral reefs are already apparent. The Great Barrier Reef, for example, has been estimated to have lost 50 percent of live coral cover since 1985, which is attributed in part to coral bleaching because of increasing water temperatures (De’ath et al., 2012). Under atmospheric CO2 concentrations that correspond to a warming of 4°C by 2100, reef erosion will likely exceed rates of calcification, leaving coral reefs as “crumbling frameworks with few calcareous corals” (Hoegh-Guldberg et al., 2007). In fact, frequency of bleaching events under global warming in even a 2°C world has been projected to exceed the ability of coral reefs to recover. The extinction of coral reefs would be catastrophic for entire coral reef ecosystems and the people who depend on them for food, income and shoreline. Reefs provide coastal protection against coastal floods and rising sea levels, nursery grounds and habitat for a variety of currently fished species, as well as an invaluable tourism asset. These valuable services to often subsistence-dependent coastal and island societies will most likely be lost well before a 4°C world is reached. The preceding discussion reviewed the implications of a 4°C world for just a few examples of important ecosystems. The section below examines the effects of climate on biological diversity Ecosystems are composed ultimately of the species and interactions between them and their physical environment. Biologically rich ecosystems are usually diverse and it is broadly agreed that there exists a strong link between this biological diversity and ecosystem productivity, stability and functioning (McGrady-Steed, Harris, and Morin, 1997; David Tilman, Wedin, and Knops, 1996)(Hector, 1999; D Tilman et al., 2001). Loss of species within ecosystems will hence have profound negative effects on the functioning and stability of ecosystems and on the ability of ecosystems to provide goods and services to human societies. It is the overall diversity of species that ultimately characterizes the biodiversity and evolutionary legacy of life on Earth. As was noted at the outset of this discussion, species extinction rates are now at very high levels compared to the geological record. Loss of those species presently classified as ‘critically endangered’ would lead to mass extinction on a scale that has happened only five times before in the last 540 million years. The loss of those species classified as ‘endangered’ and ‘vulnerable’ would confirm this loss as the sixth mass extinction episode (Barnosky 2011). Loss of biodiversity will challenge those reliant on ecosystems services. Fisheries (Dale, Tharp, Lannom, and Hodges, 2010), and agronomy (Howden et al., 2007) and forestry industries (Stram & Evans, 2009), among others, will need to match species choices to the changing climate conditions, while devising new strategies to tackle invasive pests (Bellard, Bertelsmeier, Leadley, Thuiller, and Courchamp, 2012). These challenges would have to be met in the face of increasing competition between natural and agricultural ecosystems over water resources. Over the 21st-century climate change is likely to result in some bio-climates disappearing, notably in the mountainous tropics and in the poleward regions of continents, with new, or novel, climates developing in the tropics and subtropics (Williams, Jackson, and Kutzbach, 2007). In this study novel climates are those where 21st century projected climates do not overlap with their 20th century analogues, and disappearing climates are those 20th century climates that do not overlap with 21st century projected climates. The projections of Williams et al (2007) indicate that in a 4°C world (SRES A2), 12–39 percent of the Earth’s land surface may experience a novel climate compared to 20th century analogues. Predictions of species response to novel climates are difficult because researchers have no current analogue to rely upon. However, at least such climates would give rise to disruptions, with many current species associations being broken up or disappearing entirely. Under the same scenario an estimated 10–48 percent of the Earth’s surface including highly biodiverse regions such as the Himalayas, Mesoamerica, eastern and southern Africa, the Philippines and the region around Indonesia known as Wallacaea would lose their climate space. With limitations on how fast species can disperse, or move, this indicates that many species may find themselves without a suitable climate space and thus face a high risk of extinction. Globally, as in other studies, there is a strong association apparent in these projections between regions where the climate disappears and biodiversity hotspots. Limiting warming to lower levels in this study showed substantially reduced effects, with the magnitude of novel and disappearing climates scaling linearly with global mean warming. More recent work by Beaumont and colleagues using a different approach confirms the scale of this risk (Beaumont et al., 2011, Figure 36). Analysis of the exposure of 185 eco-regions of exceptional biodiversity (a subset of the so-called Global 200) to extreme monthly temperature and precipitation conditions in the 21st century compared to 1961–1990 conditions shows that within 60 years almost all of the regions that are already exposed to substantial environmental and social pressure, will experience extreme temperature conditions based on the A2 emission scenario (4.1°C global mean temperature rise by 2100) (Beaumont et al., 2011). Tropical and sub-tropical eco-regions in Africa and South America are particularly vulnerable. Vulnerability to such extremes is particularly acute for high latitude and small island biota, which are very limited in their ability to respond to range shifts, and to those biota, such as flooded grassland, mangroves and desert biomes, that would require large geographical displacements to find comparable climates in a warmer world. The overall sense of recent literature confirms the findings of the AR4 summarized at the beginning of the section, with a number of risks such as those to coral reefs occurring at significantly lower temperatures than estimated in that report. Although non-climate related human pressures are likely to remain a major and defining driver of loss of ecosystems and biodiversity in the coming decades, it is also clear that as warming rises so will the predominance of climate change as a determinant of ecosystem and biodiversity survival. While the factors of human stresses on ecosystems are manifold, in a 4°C world, climate change is likely to become a determining driver of ecosystem shifts and large-scale biodiversity loss (Bellard et al., 2012; New et al., 2011). Recent research suggests that large-scale loss of biodiversity is likely to occur in a 4°C world, with climate change and high CO2 concentration driving a transition of the Earth´s ecosystems into a state unknown in human experience. Such damages to ecosystems would be expected to dramatically reduce the provision of ecosystem services on which society depends (e.g., hydrology—quantity flow rates, quality; fisheries (corals), protection of coastline (loss of mangroves). Barnosky has described the present situation facing the biodiversity of the planet as “the perfect storm” with multiple high intensity ecological stresses because of habitat modification and degradation, pollution and other factors, unusually rapid climate change and unusually high and elevated atmospheric CO2 concentrations. In the past, as noted above, this combination of circumstances has led to major, mass extinctions with planetary consequences. Thus, there is a growing risk that climate change, combined with other human activities, will cause the irreversible transition of the Earth´s ecosystems into a state unknown in human experience (Barnosky et al., 2012

#### 4 degree warming is inevitable with current carbon usage trends – deceasing carbon emissions solve

Potsdam Institute, 2012 (Potsdam Institute for Climate Impact Research and Climate Analytics, “Turn Down the Heat: Why a 4°C Warmer World Must be Avoided”, A report for the World Bank, November, http://climatechange.worldbank.org/sites/default/files/Turn\_Down\_the\_heat\_Why\_a\_4\_degree\_centrigrade\_warmer\_world\_must\_be\_avoided.pdf)

The emission pledges made at the climate conventions in Copenhagen and Cancun, if fully met, place the world on a trajectory for a global mean warming of well over 3°C. Even if these pledges are fully implemented there is still about a 20 percent chance of exceeding 4°C in 2100.10 If these pledges are not met then there is a much higher likelihood—more than 40 percent—of warming exceeding 4°C by 2100, and a 10 percent possibility of this occurring already by the 2070s, assuming emissions follow the medium business-as-usual reference pathway. On a higher fossil fuel intensive business-as-usual pathway, such as the IPCC SRESA1FI, warming exceeds 4°C earlier in the 21st century. It is important to note, however, that such a level of warming can still be avoided. There are technically and economically feasible emission pathways that could still limit warming to 2°C or below in the 21st century. To illustrate a possible pathway to warming of 4°C or more, Figure 22 uses the highest SRES scenario, SRESA1FI, and compares it to other, lower scenarios. SRESA1FI is a fossil-fuel intensive, high economic growth scenario that would very likely cause mean the global temperature to exceed a 4°C increase above preindustrial temperatures. Most striking in Figure 22 is the large gap between the projections by 2100 of current emissions reduction pledges and the (lower) emissions scenarios needed to limit warming to 1.5–2°C above pre-industrial levels. This large range in the climate change implications of the emission scenarios by 2100 is important in its own right, but it also sets the stage for an even wider divergence in the changes that would follow over the subsequent centuries, given the long response times of the climate system, including the carbon cycle and climate system components that contribute to sea-level rise. The scenarios presented in Figure 22 indicate the likely onset time for warming of 4°C or more. It can be seen that most of the scenarios remain fairly close together for the next few decades of the 21st century. By the 2050s, however, there are substantial differences among the changes in temperature projected for the different scenarios. In the highest scenario shown here (SRES A1FI), the median estimate (50 percent chance) of warming reaches 4°C by the 2080s, with a smaller probability of 10 percent of exceeding this level by the 2060s. Others have reached similar conclusions (Betts et al. 2011). Thus, even if the policy pledges from climate convention in Copenhagen and Cancun are fully implemented, there is still a chance of exceeding 4°C in 2100. If the pledges are not met and present carbon intensity trends continue, then the higher emissions scenarios shown in Figure 22 become more likely, raising the probability of reaching 4°C global mean warming by the last quarter of this century. Figure 23 shows a probabilistic picture of the regional patterns of change in temperature and precipitation for the lowest and highest RCP scenarios for the AR4 generation of AOGCMS. Patterns are broadly consistent between high and low scenarios. The high latitudes tend to warm substantially more than the global mean. RCP8.5, the highest of the new IPCC AR5 RCP scenarios, can be used to explore the regional implications of a 4°C or warmer world. For this report, results for RCP8.5 (Moss et al. 2010) from the new IPCC AR5 CMIP5 (Coupled Model Intercomparison Project; Taylor, Stouffer, & Meehl 2012) climate projections have been analyzed. Figure 24 shows the full range of increase of global mean temperature over the 21st century, relative to the 1980–2000 period from 24 models driven by the RCP8.5 scenario, with those eight models highlighted that produce a mean warming of 4–5°C above preindustrial temperatures averaged over the period 2080–2100. In terms of regional changes, the models agree that the most pronounced warming (between 4°C and 10°C) is likely to occur over land. During the boreal winter, a strong “arctic amplification” effect is projected, resulting in temperature anomalies of over 10°C in the Arctic region. The subtropical region consisting of the Mediterranean, northern Africa and the Middle East and the contiguous United States is likely to see a monthly summer temperature rise of more than 6°C.

## Contention 3: Solvency

#### Cuban sugar based ethanol is essential to replace oil based fuel—it’s the best solution for a transition away from oil-based fuel dependence—allowing access to the U.S. market is key

Specht 13

[Jonathan-J.D. Wash. U St. Louis, Legal Advisor, “Raising Cane: Cuban Sugarcane Ethanol’s Economic and Environmental Effects on the United States,” Environmental Law & Policy Journal, Univ. of California Davis, Vol. 36:2, <http://environs.law.ucdavis.edu/issues/36/2/specht.pdf>]

"The United States of America cannot afford to bet our long-term prosperity and security on a resource that will eventually run out." n1 This dramatic quote from President Obama opens the White House's forty-four page Blueprint for a Secure Energy Future. n2 The resource referred to, oil, is indeed finite. "The output of conventional oil will peak in 2020," according to estimates from the chief economist for the International Energy Agency. n3 The transportation sector has increased its oil consumption over the past thirty years in the United States while residential, commercial, and electric utilities have decreased consumption. n4 Simply put, America's oil problem is an automobile problem. [\*173] There are a number of ways the U.S. transportation sector could reduce the amount of oil it consumes: raising vehicle fuel efficiency standards further; increasing and improving light rail and other public transportation options; building more walkable communities so daily errands could be made without using an automobile; encouraging people to live closer to where they work; and increasing the availability of electric cars. n5¶ Yet, even using all of these strategies comprehensively will not change a fundamental fact of our oil-based transportation system - in certain areas (like rural communities and outer suburbs) the automobile is essential for transportation, and liquid fuel is extremely convenient for automobiles. With a liquid fuel engine, a driver can "re-charge" his or her car in a few minutes with a substance that is widely available from Boston to Boise and everywhere in between. With the conveniences of oil, however, come costs. Oil is a finite resource, and its consumption pollutes the air and contributes to climate change. Furthermore, it is expensive n6 and will only get more expensive in the future. n7 However, any realistic plan for dealing with a future of reduced oil use must include liquid fuels that are similar in convenience and availability to gasoline, given the geography of the United States, the state of the current domestic transportation system, n8 and the ease of using liquid fuel for the personal automobile.¶ This does not mean, however, that corn-based ethanol, thus far the major liquid-fuel petroleum alternative pursued by the United States, is the best answer. While it has benefitted the Midwest economically, the domestic ethanol industry has also contributed to a number of negative environmental effects. There is, however, another liquid fuel option other than fossil-fuel based [\*174] gasoline and corn-based ethanol. The Obama Administration's energy plan includes a wide range of strategies to reduce U.S. fossil fuel consumption, yet one strategy is notably absent from the Blueprint: replacing a percentage of U.S. gasoline with ethanol imported from outside the United States. n9 A number of influential commentators, such as Thomas Friedman n10 and The Economist, n11 have called for the United States to encourage the importation of sugarcane-based ethanol from countries like Brazil. But the possibility of importing ethanol from Cuba has been largely ignored by influential opinion-makers as well as the United States government. n12 While by no means a silver bullet for solving the United States' energy problems, importing ethanol made from sugarcane grown in Cuba would bring a number of environmental and economic benefits - partially offset by regionalized economic harms - to the United States. This possibility, at the very least, deserves much greater consideration and evaluation than it has thus far received.

#### And, joint ventures jumpstart the Cuban ethanol energy industry

Alonso-Pippo et al. 8

[Walfrido Alonso-Pippo- former Vice-President of the Solar Energy Department at the University of Havana and a former member of the Cuban National Renewable Energies Front, where he was a specialist in biomass energy use, Carlos A. Luengo, John Koehlinger, Pierto Garzone, Giacinto Cornacchia, “Sugarcane energy use: The Cuban case,” Energy Policy, Vol. 36, Issue 6, June 2008, <http://www.sciencedirect.com/science/article/pii/S0301421508000840>]

The rise of the price of oil above 80 USD/bbl. provides an incentive for the development of sugarcane bioenergy through both ethanol fuel production and surplus electricity surplus cogeneration in Cuba. Cuba's longstanding experience and expertise in sugar production and its sugar agro-industry infrastructure, its current neglect and mismanagement notwithstanding, put Cuba in a good position to become an important producer of sugar-based bioenergy.¶ Cuba's own acute energy and hard currency shortages further point to an incremental increase in sugarcane energy use as the country's first viable renewable energy source. No other source of renewable energy in Cuba has the potential that sugarcane has.¶ International experiences in developing sugarcane energy, particularly that of Brazil and to a lesser extent Mauritius, have demonstrated that the technological and environmental barriers to sugarcane energy production and use can be overcome. Aside from providing an alternative energy source to fossil fuels, sugarcane ethanol production and sugarcane biomass power generation have, in the face of an oversupply of sugar and low sugar prices, been promoted in several countries to save domestic sugar industries.¶ The main weakness to the introduction of ethanol fuel production and sugarcane biomass power generation in Cuba continues to be the lack of hard currency required to modernize Cuban sugar mills. The Cuban government has already utilized joint ventures with foreign natural gas, oil (in the case of the Caribbean offshore exploration mentioned previously) and nickel mining companies to secure the capital investment and technology needed to exploit its natural resources. The joint venture agreement for a recently constructed natural gas power plant could serve as a model for modernization of sugar bioenergy infrastructure. Under this agreement, the foreign partner owns a third of the plant's output, participates in the plant's management, and receives a proportion of the plant's profits. While the legal, institutional and political barriers to investment in Cuba are high, heavy recent foreign investments in sugar ethanol production facilities in Brazil suggest the feasibility of similar investments in Cuba.¶ Whether the modernization and recovery of the Cuban sugar agro-industry comes to pass is of course an open question. The authors offer no predictions. What has been argued though is that, despite the prolonged decline outlined above, the Cuban sugar industry nonetheless remains well-positioned to participate in the growing global movement toward the development of sugarcane as a viable alternative source of energy.

#### Sugar ethanol importation from Cuba is superior to alternatives and solves impacts from domestic corn ethanol production—no environmental damage

Specht 13

[Jonathan-J.D. Wash. U St. Louis, Legal Advisor, “Raising Cane: Cuban Sugarcane Ethanol’s Economic and Environmental Effects on the United States,” Environmental Law & Policy Journal, Univ. of California Davis, Vol. 36:2, <http://environs.law.ucdavis.edu/issues/36/2/specht.pdf>]

B. Environmental Effects of Sugarcane-Based Ethanol¶ If future legislation does not revive the United States ethanol tariff that expired at the end of 2011 and the trade embargo against Cuba is kept in place, Brazil will likely be the primary beneficiary. n109 The argument can be made that Brazilian sugarcane-based ethanol is a more environmentally beneficial fuel source than domestic-corn based ethanol, because of the nature of sugarcane-based ethanol (discussed below). n110 Brazilian sugarcane-based ethanol comes, however, with its own set of environmental consequences.¶ The full debate over the environmental consequences of the Brazilian biofuel production n111 is largely beyond the scope of this Article. Still, the primary issue in this dispute is worth noting, because it accentuates one of the most significant differences between the U.S. corn-based ethanol industry and the potential Cuban sugarcane-based ethanol industry. In Brazil, the expansion of sugarcane production to meet demand for ethanol production has led to land use changes [\*190] that parallel the expansion of corn production for ethanol in the United States. Clearing portions of the Amazon rainforest - one of the most significant repositories of carbon on Earth n112 - would represent an environmental cost of ethanol production that outweighs its benefits. The Amazon region, however, is largely unsuitable for sugarcane production. n113 But, sugarcane production is contributing to destruction of another sensitive habitat, the bio-diverse Cerrado savannah region of Brazil. n114¶ Cuban sugarcane-based ethanol would have the environmental benefits of Brazilian sugarcane-based ethanol without its most obvious negative factor, damaging habitat in the Cerrado. The environmental effects of biofuels depend on a number of factors. Whether or not a given type of biofuel is environmentally beneficial "depends on what the fuel is, how and where the biomass was produced, what else the land could have been used for, how the fuel was processed and how it is used." n115 Taken together, these factors point to sugarcane-based ethanol grown in Cuba as one of the most environmentally friendly biofuels possible.¶ The environmental benefits of using sugarcane to produce ethanol are numerous. First, it is much more energy efficient to derive ethanol from sugarcane than corn. Making ethanol from corn only creates approximately 1.3 times the amount of energy used to produce it, but making ethanol from sugarcane creates approximately eight times the amount of energy used to produce it. n116 Second, unlike much of the corn presently grown in Great Plains states, sugarcane grown in Latin America does not need to be irrigated. n117 Third, sugarcane requires relatively small amounts of chemical fertilizers, herbicides, and pesticides. n118 Fourth, whereas most U.S. ethanol refineries are powered by coal or natural gas, n119 sugarcane ethanol refineries can be powered by bagasse, a natural product left over from the sugar refining process. n120 In fact, refineries powered with bagasse can even produce more electricity than they need and sell [\*191] power back to the electric grid. n121 Fifth, although corn can only be planted and harvested once a year, in tropical climates sugarcane can be cut from the same stalks multiple times per year. n122¶ Each of these factors in favor of sugarcane ethanol is true of ethanol from Brazil as well as of any potential ethanol from Cuba. However, there are additional environmental factors that clinch Cuban sugarcane-based ethanol as one of the most environmentally friendly fuel sources available to the United States under current technology. n123 First, because Cuba is closer to the United States, transporting ethanol from Cuba to the United States would require less energy than transporting ethanol from Brazil to the United States (especially if it is used in Florida, an option further explored in the section on economic effects). n124¶ Another reason Cuban sugarcane-based ethanol could be one of the most environmentally friendly fuels possible is that Cuba could produce a significant amount of ethanol without any negative impacts on native habitat. A striking amount of Cuban agricultural land - fifty five percent as of 2007 - is simply lying fallow and is not cultivated with anything. n125 Although its character may have changed due to years of neglect, this land is not virgin native habitat like the grasslands of North Dakota or the Cerrado of Brazil. Cuba therefore could greatly increase its production of sugarcane, and thus its production of sugarcane-based ethanol, without negative impacts on wildlife habitat. While it is not environmentally perfect - no form of energy is - Cuban sugarcane-based ethanol would raise fewer environmental concerns than the fuel sources it would displace: petroleum, domestic corn-based ethanol, and Brazilian sugarcane based ethanol. Therefore, from a purely environmental perspective, changing U.S. law and policy in order to promote the importation of Cuban sugarcane-based ethanol should be encouraged.

## Contention 4: Impact Debate

#### No great power war – interdependence, democracy , deterrence

Robb 2012

[Doug, US Navy Lieutenant, “Now Hear This – Why the Age of Great-Power War Is Over”, May, 5/2012 [Lieutenant, US Navy, “”, US Naval Institute, <http://www.usni.org/magazines/proceedings/2012-05/now-hear-why-age-great-power-war-over>]

In addition to geopolitical and diplomacy issues, globalization continues to transform the world. This interdependence has blurred the lines between economic security and physical security. Increasingly, great-power interests demand cooperation rather than conflict. To that end, maritime nations such as the United States and China desire open sea lines of communication and protected trade routes, a common security challenge that could bring these powers together, rather than drive them apart (witness China’s response to the issue of piracy in its backyard). Facing these security tasks cooperatively is both mutually advantageous and common sense. Democratic Peace Theory—championed by Thomas Paine and international relations theorists such as New York Times columnist Thomas Friedman—presumes that great-power war will likely occur between a democratic and non-democratic state. However, as information flows freely and people find outlets for and access to new ideas, authoritarian leaders will find it harder to cultivate popular support for total war—an argument advanced by philosopher Immanuel Kant in his 1795 essay “Perpetual Peace.” Consider, for example, China’s unceasing attempts to control Internet access. The 2011 Arab Spring demonstrated that organized opposition to unpopular despotic rule has begun to reshape the political order, a change galvanized largely by social media. Moreover, few would argue that China today is not socially more liberal, economically more capitalistic, and governmentally more inclusive than during Mao Tse-tung’s regime. As these trends continue, nations will find large-scale conflict increasingly disagreeable. In terms of the military, ongoing fiscal constraints and socio-economic problems likely will marginalize defense issues. All the more reason why great powers will find it mutually beneficial to work together to find solutions to common security problems, such as countering drug smuggling, piracy, climate change, human trafficking, and terrorism—missions that Admiral Robert F. Willard, former Commander, U.S. Pacific Command, called “deterrence and reassurance.” As the Cold War demonstrated, nuclear weapons are a formidable deterrent against unlimited war. They make conflict irrational; in other words, the concept of mutually assured destruction—however unpalatable—actually had a stabilizing effect on both national behaviors and nuclear policies for decades. These tools thus render great-power war infinitely less likely by guaranteeing catastrophic results for both sides. As Bob Dylan warned, “When you ain’t got nothing, you ain’t got nothing to lose.” Great-power war is not an end in itself, but rather a way for nations to achieve their strategic aims. In the current security environment, such a war is equal parts costly, counterproductive, archaic, and improbable.

#### Miscalc is impossible

Quinlan 2009

[Sir Michael, visiting professor at King's College London, Permanent Under-Secretary at the Ministry of Defence and former senior fellow at the International Institute of Strategic Studies, “Thinking About Nuclear Weapons: Principles, Problems, Prospects,” Oxford University Press]

One special form of miscalculation appeared sporadically in the speculations of academic commentators, though it was scarcely ever to be encountered—at least so far as my own observation went—in the utterances of practical planners within government. This is the idea that nuclear war might be erroneously triggered, or erroneously widened, through a state under attack misreading either what sort of attack it was being subjected to, or where the attack came from. The postulated misreading of the nature of the attack referred in particular to the hypothesis that if a delivery system—normally a missile—that was known to be capable of carrying either a nuclear or a conventional warhead was launched in a conventional role, the target country might, on detecting the launch through its early warning systems, misconstrue the mission as an imminent nuclear strike and immediately unleash a nuclear counter-strike of its own. This conjecture was voiced, for example, as a criticism of the proposals for giving the US Trident SLBM, long associated with nuclear missions, a capability to deliver conventional warheads. Whatever the merit of those proposals (it is not explored here), it is hard to regard this particular apprehension as having any real-life credibility. The ﬂight time of a ballistic missile would not exceed about thirty minutes, and that of a cruise missile a few hours, before arrival on target made its character—conventional or nuclear—unmistakable. No government will need, and no nonlunatic government could wish, to take within so short a span of time a step as enormous and irrevocable as the execution of a nuclear strike on the basis of early-warning information alone without knowing the true nature of the incoming attack. The speculation tends moreover to be expressed without reference either to any realistic political or conﬂict-related context thought to render the episode plausible, or to the manifest interest of the launching country, should there be any risk of doubt, in ensuring—by explicit communication if necessary—that there was no misinterpretation of its conventionally armed launch.

**Intervening actions check escalation**

Trachtenberg 2000

(Prof of History, Pennsylvania (Marc, The "Accidental War" Question, http://www.sscnet.ucla.edu/polisci/faculty/trachtenberg/cv/inadv(1).pdf)

The second point has to do with how much risk there really is in situations of this sort. It should not be assumed too readily that states underestimate the degree to which they lose control of the situation when they engage in a crisis. States can generally **pull back from the brink** if they really want to; prestige will be sacrificed, but often states are willing to pay that price. The history of international politics in the century that just ended is **full of crises** that were liquidated by one side accepting what amounted to defeat, sometimes even humiliating defeat; and in the July Crisis in 1914, the German government chose at the most critical moment to let the war come rather than press for a compromise solution.9 The key thing here is that in 1914 and 1939 political leaders had not totally lost control, but had chosen to accept war rather than back off in a crisis. Their aversion to war was not overwhelming. But when both sides very much want to avoid a full-scale armed conflict, the story is very different. This was the case during the Cold War. People sometimes seem to assume that peace was hanging by a thread during that conflict, and that we were lucky to make our way through it without a thermonuclear holocaust. But I don't think this is true at all: and in general I think it is **very unlikely** that a great war would break out if both sides are determined to avoid it. These arguments about how war could break out almost by accident were frequently made during the Cold War itself--and indeed were made by responsible and experie nced officials. A British document from March 1946, for example, argued that the Soviets did not want war, but the kind of tactics they used with the West might lead to a war that neither side wanted: "although the intention may be defensive, the tactics will be offensive, and the danger always exists that Russian leaders may misjudge how far they can go without provoking war with American or ourselves."10 A year later, a British Foreign Office official warned that the fact that the Soviets had military superiority in Europe might make them careless, and that they might "misjudge what measures can safely be taken without producing a serious crisis." Events might get out of control and a situation might develop that could "lead to disaster."11 What is wrong with this point of view? It assumes that the Soviets would not be cautious, that they would not frame their actions very carefully with an eye to the American reaction, that in deciding how far to go they would not gauge very closely how the Americans reacted to the measures they had taken up to that point. This point of view assumes also that the Soviets would find it very hard to draw back if it became clear that they had overstepped the bounds and had thought the American reaction would not be as vigorous as it in fact was--or indeed that they had not made the mental reservation that they could draw back, in necessary, when they decided to embark on a provocative course of action. Basically the assumption is that the Soviets did not care enough about what a war would entail to take these rather elementary and normal precautions. This point of view also assumes that the American response would be very rigid and "spring-loaded": a slight Soviet infringement, and the Americans immediately take the plunge into general war--as though there are no intermediate measures of a political or military nature that would be taken, no process that would unfold within which the two sides would test each other out before resorting to extreme measures. To my mind, anyone with any sense should know that things would **never** move directly and mechanically from initial provocation to full-scale war, that things would unfold almost inevitably in a more complex way--or, in short, that enough "**cushioning**" exists in the system to keep relatively minor provocations from leading directly to general war.

#### Nuclear war doesn’t cause extinction

**Socol 2011**

Yehoshua (Ph.D.), an inter-disciplinary physicist, is an expert in electro-optics, high-energy physics and applications, and material science and Moshe Yanovskiy, Jan 2, “Nuclear Proliferation and Democracy”, http://www.americanthinker.com/2011/01/nuclear\_proliferation\_and\_demo.html, CMR

Nuclear proliferation should no longer be treated as an unthinkable nightmare; it is likely to be the future reality. Nuclear weapons have been acquired not only by an extremely poor per capita but large country such as India, but also by even poorer and medium-sized nations such as Pakistan and North Korea. One could also mention South Africa, which successfully acquired a nuclear arsenal despite economic sanctions (the likes of which have not yet been imposed on Iran). It is widely believed that sanctions and rhetoric will not prevent Iran from acquiring nuclear weapons and that many countries, in the Middle East and beyond, will act accordingly (see, e.g., recent Heritage report). Nuclear Warfare -- Myths And Facts The direct consequences of the limited use of nuclear weapons -- especially low-yield devices most likely to be in the hands of non-state actors or irresponsible governments -- **would** probably **not be great enough** to bring about significant geopolitical upheavals. Casualties from a single 20-KT nuclear device are estimated [1] at about 25,000 fatalities with a similar number of injured, assuming a rather unfortunate scenario (the center of a large city, with minimal warning). Scaling the above toll to larger devices or to a larger number of devices is less than linear. For example, it has been estimated that it would take as many as eighty devices of 20-KT yield each to cause 300,000 civilian fatalities in German cities (a result actually achieved by Allied area attacks, or carpet-bombings, during the Second World War). A single 1-MT device used against Detroit has been estimated by U.S. Congress OTA to result in about 220,000 fatalities. It is anticipated that well-prepared civil defense measures, based on rather simple presently known techniques, would decrease these numbers by maybe an order of magnitude (as will be discussed later). There is little doubt that a nation determined to survive and with a strong sense of its own destiny **would not succumb to** such **losses**. It is often argued that the fallout effects of even the limited use of nuclear weapons would be worldwide and would last for generations. This is an **exaggeration**. The following facts speak for themselves. -- In Japan, as assessed by REFR, less than 1,000 excess cancer cases (i.e., above the natural occurrence) were recorded in over 100,000 survivors over the past sixty years -- compared with about 110,000 immediate fatalities in the two atomic bombings. No clinical or even sub-clinical effects were discovered in the survivors' offspring. -- In the Chernobyl area, as assessed by IAEA, only fifteen cancer deaths can be directly attributed to fallout radiation. No radiation-related increase in congenital formations was recorded. Nuclear Conflict -- Possible Scenarios With reference to a possible regional nuclear conflict between a rogue state and a democratic one, the no-winner (mutual assured destruction) scenario is probably false. An analysis by Anthony Cordesman, et al. regarding a possible Israel-Iran nuclear conflict estimated that while Israel might survive an Iranian nuclear blow, Iran would certainly not survive as an organized society. Even though the projected casualties cited in that study seem to us overstated, especially as regards Israel, the conclusion rings true. Due to the extreme high intensity ("above-conventional") of nuclear conflict, it is nearly certain that such a war, no matter its outcome, **would not last for years,** as we have become accustomed to in current low-intensity conflicts. Rather, we should anticipate a new geo-political reality: the emergence of clear winners and losers **within** several **days**, or at most weeks after the initial outbreak of hostilities. This latter reality will most probably contain fewer nuclear-possessing states than the former.

# 2AC Add-ons

### 2AC Water Add-on--No War Version

#### Continued increases in U.S. corn-ethanol production will drain the Ogallala Aquifer—causing massive water shortages

Specht 13

[Jonathan-J.D. Wash. U St. Louis, Legal Advisor, “Raising Cane: Cuban Sugarcane Ethanol’s Economic and Environmental Effects on the United States,” Environmental Law & Policy Journal, Univ. of California Davis, Vol. 36:2, <http://environs.law.ucdavis.edu/issues/36/2/specht.pdf>]

Increased water consumption is another environmental consequence resulting from the expansion of corn production in Great Plains states. The approximate line dividing the portion of the United States that requires irrigation for agriculture and the portion that has sufficient rainfall for non-irrigated agriculture, the 100th Meridian West of longitude, n101 runs through the Dakotas and Nebraska. Therefore, unlike agriculture in the states that form the center of the Corn Belt, Iowa and Illinois, n102 agriculture in Nebraska and the Dakotas depends to significant degree upon irrigation. The difference in water consumption between the corn growers of Nebraska, on one hand, and those of Iowa and Illinois, on the other, is dramatic. In 2007, of 9,192,656 acres of total corn production in Nebraska, 5,839,067 acres were irrigated, representing 63% of the total acreage. n103¶ This fact is particularly significant because much of Nebraska gets its water from the Ogallala Aquifer, a resource of vital environmental and economic importance to the United States that stretches from Texas to South Dakota. n104 Aquifers n105 continue to provide water as long as the amount of water that flows into them exceeds the amount of water that is withdrawn. If the amount of water withdrawn from an aquifer exceeds the amount of water that recharges an aquifer, however, the aquifer will be depleted. Completely depleting the Ogallala Aquifer would have devastating consequences for the United States. Losing the ability to irrigate land from the Ogallala Aquifer would cause $ 20 billion worth of agricultural losses, and re-filling the aquifer would take 6,000 years. n106 Because the industry encourages increased corn production in areas irrigated with water from the Ogallala Aquifer, the depletion of this aquifer must [\*189] be counted as another detrimental environmental effect of the domestic corn-based ethanol industry.¶ As damning as the list of environmental consequences of the domestic corn-based ethanol industry may seem, advocates for the industry will point out that the gasoline replaced by corn-based ethanol comes with its own set of dramatic consequences, environmental and otherwise: carbon emissions, pollution from petroleum refining, and dependence on unstable foreign regimes. n107 This is certainly true, n108 and any fair evaluation of whether or not the domestic corn-based ethanol industry is a worthy endeavor must consider all these factors. However, the question of whether corn-based ethanol or petroleum-based gasoline is the least environmentally harmful fuel source for the United States is a false dichotomy - or at least it would be if U.S. law and policy were changed to encourage the importation of sugarcane-based ethanol.

#### Drinking water is key to life on earth

Jackson and Carpenter 1

[Robert- Department of Biology and Nicholas School of the Environment, Duke, Stephen- Center for Limnology, University of Wisconsin, Clifford Dahm, Diane McKnight- University of New Mexico,, Robert Naiman- University of Colorado, Sandra Postel-University of Washington, Steven Running, “Water in a Changing World,” Issues in Ecology, http://www.biology.duke.edu/jackson/issues9.pdf, Spring 2001]

Life on earth depends on the continuous flow of materials through the air, water, soil, and food webs of the biosphere. The movement of water through the hydrological cycle comprises the largest of these flows, delivering an estimated 110,000 cubic kilometers (km3) of water to the land each year as snow and rainfall. Solar energy drives the hydrological cycle, vaporizing water from the surface of oceans, lakes, and rivers as well as from soils and plants (evapotranspiration). Water vapor rises into the atmosphere where it cools, condenses, and eventually rains down anew. This renewable freshwater supply sustains life on the land, in estuaries, and in the freshwater ecosystems of the earth. Renewable fresh water provides many services essential to human health and well being, including water for drinking, industrial production, and irrigation, and the production of fish, waterfowl, and shellfish. Fresh water also provides many benefits while it remains in its channels (nonextractive or instream benefits), including flood control, transportation, recreation, waste processing, hydroelectric power, and habitat for aquatic plants and animals. Some benefits, such as irrigation and hydroelectric power, can be achieved only by damming, diverting, or creating other major changes to natural water flows. Such changes often diminish or preclude other instream benefits of fresh water, such as providing habitat for aquatic life or maintaining suitable water quality for human use. The ecological, social, and economic benefits that freshwater systems provide, and the trade-offs between consumptive and instream values, will change dramatically in the coming century. Already, over the past one hundred years, both the amount of water humans withdraw worldwide and the land area under irrigation have risen exponentially (Figure 1). Despite this greatly increased consumption, the basic water needs of many people in the world are not being met. Currently, 1.1 billion people lack access to safe drinking water, and 2.8 billion lack basic sanitation services. These deprivations cause approximately 250 million cases of water-related diseases and five to ten million deaths each year. Also, current unmet needs limit our ability to adapt to future changes in water supplies and distribution. Many current systems designed to provide water in relatively stable climatic conditions may be ill prepared to adapt to future changes in climate, consumption, and population. While a global perspective on water withdrawals is important for ensuring sustainable water use, it is insufficient for regional and local stability. How fresh water is managed in particular basins and in individual watersheds is the key to sustainable water management.

### 2AC Democracy Add-on--No War Version

#### Plan solves corruption-civil society

Perales 10

(José Raúl Perales - senior program associate of the Latin American Program at the Woodrow Wilson International Center for Scholars, August 2010, “The United States and Cuba: Implications of an Economic Relationship”, http://www.wilsoncenter.org/sites/default/files/LAP\_Cuba\_Implications.pdf)

Jorge Piñón is a visiting research fellow with Florida International University’s LatinAmerican and Caribbean Center Cuban Research Institute.

In spite of these developments, Piñón argued it is in the best interests of both Cuba and the United States to begin energy collaboration today.What is needed, Piñón continued, is a bilateral policy that would contribute to Cuba’s energy independence as well as support a broader national energy policy that embraces modernization of infrastructure, the balancing of hydrocarbons with renewable materials, and conservation and environmental stewardship. He highlighted the case of the Deepwater Horizon disaster in the Gulf of Mexico, and what would happen if such an incident happened in a Cuban oil rig (under current U.S. policy banning equipment and technological sales to the island), as a reminder of the need for an energy dialogue between Cuba and the United States. Moreover, Piñón contended that if U.S. companies were allowed to contribute to developing Cuba’s hydrocarbon reserves, as well as renewable energy such as solar, wind, and sugarcane ethanol, it would reduce the influence of autocratic and corrupt governments on the island’s road toward self determination. Most importantly, it would provide the United States and other democratic countries with a better chance of working with Cuba’s future leaders to carry out reforms that would lead to a more open and representative society. American oil and oil

equipment and service companies have the capital, technology, and operational know-how to explore, produce,and refine in a safe and responsible manner Cuba’s potential oil and natural gas reserves.

#### Moral side constraint

**Petro** **1974**

[Sylvester, Wake Forest Professor in Toledo Law Review, Spring, page 480]

However, one may still insist, echoing Ernest Hemingway - "I believe in only one thing: liberty." And it is always well to bear in mind David Hume's observation: "**It is seldom that liberty of any kind is lost all at once**." Thus, **it is unacceptable to say that the invasion of one aspect of freedom is of no import because there have been invasions of so many other aspects. That road leads to chaos, tyranny, despotism, and the end of all human aspiration**. Ask Solzhenitsyn. Ask Milovan Dijas. In sum, if one believed in freedom as a supreme value and the proper ordering principle for any society aiming to maximize spiritual and material welfare, then **every invasion of freedom must be emphatically identified and resisted with undying spirit**.

# 1AC Advantages (Yes War Version)

### 1AC U.S./Cuba Relations Adv (Yes War)

#### The sugar ethanol industry is a key area to build U.S./Cuba relations

Colvin, Jaffe, Soligo 09

(Jake Colvin- Vice President for Global Trade Issues at the National Foreign Trade Council and

directs the Cuba Initiative of USA, Amy Myers Jaffe - research scholar at the James A. Baker III Institute for Public Policy, whose focus is on oil geopolitics and strategic energy policy, and Dr. Ronald Soligo - professor of economics at Rice University and a Rice Scholar at the Baker Institute research focuses on economic growth and development and energy economics, “9 WAYS FOR U.S. TO TALK TO CUBA AND FOR CUBA TO TALK TO US”

The Center for Democracy in the Americas (CDA), http://democracyinamericas.org/pdfs/9-Ways-for-US-to-talk-to-Cuba-and-for-Cuba-to-talk-to-US.pdf)

There are numerous topics of global and mutual interest to talk about. nine The Center for Democracy in the Americas has identified critical areas where Washington and Havana can communicate, work together and build relationships of confidence and trust.¶ Energy cooperation: The expertise of the U.S. energy industry could speed Cuba’s development of abundant untapped oil resources, increase Cuba’s ability to produce ethanol, boost energy supplies to the U.S., and help Cuba’s economy.¶ Commercial cooperation: Opportunities for trade and commerce with Cuba would help U.S. firms compete against foreign firms, which operate in Cuba without restrictions, while improving Cuban living standards and working conditions.¶

#### Now a key time for US-Latin American ties. Permanent collapse coming.

Shifter ‘12

(Michael is an Adjunct Professor of Latin American Studies at Georgetown University's School of Foreign Service. He is a member of the Council on Foreign Relations and writes for the Council's journal Foreign Affairs. He serves as the President of Inter-American Dialogue. “Remaking the Relationship: The United States and Latin America,” April, IAD Policy Report, http://www.thedialogue.org/PublicationFiles/IAD2012PolicyReportFINAL.pdf)

If the United States and Latin America do not make the effort now, the chance may slip away. The most likely scenario then would be marked by a continued drift in their relationship, further deterioration of hemisphere-wide institutions, a reduced ability and willingness to deal with a range of common problems, and a spate of missed opportunities for more robust growth and greater social equity. The United States and Latin America would go their separate ways, manage their affairs independently of one another, and forego the opportunities that could be harvested by a more productive relationship. There are risks of simply maintaining the status quo. Urgent problems will inevitably arise that require trust and effective collaboration to resolve. And there is a chance that tensions between the United States and Latin America could become much worse, adversely affecting everyone’s interests and wellbeing. It is time to seize the moment and overhaul hemispheric relations.

#### Cuba is key to US-Latin American Relations. Specifically spills-over to *global* coop on nuclear material transfers.

Shifter ‘12

(Michael is an Adjunct Professor of Latin American Studies at Georgetown University's School of Foreign Service. He is a member of the Council on Foreign Relations and writes for the Council's journal Foreign Affairs. He serves as the President of Inter-American Dialogue. “Remaking the Relationship: The United States and Latin America,” April, IAD Policy Report, http://www.thedialogue.org/PublicationFiles/IAD2012PolicyReportFINAL.pdf)

Cuba, too, poses a significant challenge for relations between the United States and Latin America. The 50-year-old US embargo against Cuba is rightly criticized throughout the hemisphere as a failed and punitive instrument. It has long been a strain on US-Latin American relations. Although the United States has recently moved in the right direction and taken steps to relax restrictions on travel to Cuba, Washington needs to do far more to dismantle its severe, outdated constraints on normalized relations with Cuba. Cuba is one of the residual issues that most obstructs more effective US-Latin American engagement. At the same time, Cuba’s authoritarian regime should be of utmost concern to all countries in the Americas. At present, it is the only country without free, multi-party elections, and its government fully controls the press. Latin American and Caribbean nations could be instrumental in supporting Cuba’s eventual transition to democratic rule. An end to the US policy of isolating Cuba, without setting aside US concern about human rights violations, would be an important first step. Many of the issues on the hemispheric agenda carry critical global dimensions. Because of this, the United States should seek greater cooperation and consultation with Brazil, Mexico, and other countries of the region in world forums addressing shared interests. Brazil has the broadest international presence and influence of any Latin American nation. In recent years it has become far more active on global issues of concern to the United States. The United States and Brazil have clashed over such issues as Iran’s nuclear program, non-proliferation, and the Middle East uprisings, but they have cooperated when their interests converged, such as in the World Trade Organization and the G-20 (Mexico, Argentina, and Canada also participate in the G-20), and in efforts to rebuild and provide security for Haiti. Washington has worked with Brazil and other Latin American countries to raise the profile of emerging economies in various international financial agencies, including the World Bank and the International Monetary Fund. In addition to economic and financial matters, Brazil and other Latin American nations are assuming enhanced roles on an array of global political, environmental, and security issues. Several for which US and Latin American cooperation could become increasingly important include: As the world’s lone nuclear-weapons-free region, Latin America has the opportunity to participate more actively in non-proliferation efforts. Although US and Latin American interests do not always converge on non-proliferation questions, they align on some related goals. Forexample, the main proliferation challenges today are found in developing and unstable parts of the world, as well as in the leakage—or transfer of nuclear materials—to terrorists. In that context, south-south connections are crucial. Brazil could play a pivotal role. Many countries in the region give priority to climate change challenges. This may position them as a voice in international debates on this topic. The importance of the Amazon basin to worldwide climate concerns gives Brazil and five other South American nations a special role to play. Mexico already has assumed a prominent position on climate change and is active in global policy debates. Brazil organized the first-ever global environmental meeting in 1992 and, this year, will host Rio+20. Mexico hosted the second international meeting on climate change in Cancún in 2010. The United States is handicapped by its inability to devise a climate change policy. Still, it should support coordination on the presumptionof shared interests on a critical policy challenge. Latin Americans are taking more active leadership on drug policy in the hemisphere and could become increasingly influential in global discussions of drug strategies. Although the United States and Latin America are often at odds on drug policy, they have mutual interests and goals that should allow consultation and collaboration on a new, more effective approach to the problem.

#### Nuclear terrorism escalates to major nuclear war. Global coop on material transfers is key

Ayson’10

Robert – Professor of Strategic Studies and Director of the Centre for Strategic Studies: New Zealand at the Victoria University of Wellington – “After a Terrorist Nuclear Attack: Envisaging Catalytic Effects,” Studies in Conflict & Terrorism, Volume 33, Issue 7, July, obtained via InformaWorld

A terrorist nuclear attack, and even the use of nuclear weapons in response by the country attacked in the first place, would not necessarily represent the worst of the nuclear worlds imaginable. Indeed, there are reasons to wonder whether nuclear terrorism should ever be regarded as belonging in the category of truly existential threats. A contrast can be drawn here with the global catastrophe that would come from a massive nuclear exchange between two or more of the sovereign states that possess these weapons in significant numbers. Even the worst terrorism that the twenty-first century might bring would fade into insignificance alongside considerations of what a general nuclear war would have wrought in the Cold War period. And it must be admitted that as long as the major nuclear weapons states have hundreds and even thousands of nuclear weapons at their disposal, there is always the possibility of a truly awful nuclear exchange taking place precipitated entirely by state possessors themselves. But these two nuclear worlds—a non-state actor nuclear attack and a catastrophic interstate nuclear exchange—are not necessarily separable. It is just possible that some sort of terrorist attack, and especially an act of nuclear terrorism, could precipitate a chain of events leading to a massive exchange of nuclear weapons between two or more of the states that possess them. In this context, today’s and tomorrow’s terrorist groups might assume the place allotted during the early Cold War years to new state possessors of small nuclear arsenals who were seen as raising the risks of a catalytic nuclear war between the superpowers started by third parties. These risks were considered in the late 1950s and early 1960s as concerns grew about nuclear proliferation, the so-called n+1 problem. It may require a considerable amount of imagination to depict an especially plausible situation where an act of nuclear terrorism could lead to such a massive inter-state nuclear war. For example, in the event of a terrorist nuclear attack on the United States, it might well be wondered just how Russia and/or China could plausibly be brought into the picture, not least because they seem unlikely to be fingered as the most obvious state sponsors or encouragers of terrorist groups. They would seem far too responsible to be involved in supporting that sort of terrorist behavior that could just as easily threaten them as well. Some possibilities, however remote, do suggest themselves. For example, how might the United States react if it was thought or discovered that the fissile material used in the act of nuclear terrorism had come from Russian stocks, FN 40 and if for some reason Moscow denied any responsibility for nuclear laxity? The correct attribution of that nuclear material to a particular country might not be a case of science fiction given the observation by Michael May et al. that while the debris resulting from a nuclear explosion would be “spread over a wide area in tiny fragments, its radioactivity makes it detectable, identifiable and collectable, and a wealth of information can be obtained from its analysis: the efficiency of the explosion, the materials used and, most important … some indication of where the nuclear material came from.”41 Alternatively, if the act of nuclear terrorism came as a complete surprise, and American officials refused to believe that a terrorist group was fully responsible (or responsible at all) suspicion would shift immediately to state possessors. Ruling out Western ally countries like the United Kingdom and France, and probably Israel and India as well, authorities in Washington would be left with a very short list consisting of North Korea, perhaps Iran if its program continues, and possibly Pakistan. But at what stage would Russia and China be definitely ruled out in this high stakes game of nuclear Cluedo? In particular, if the act of nuclear terrorism occurred against a backdrop of existing tension in Washington’s relations with Russia and/or China, and at a time when threats had already been traded between these major powers, would officials and political leaders not be tempted to assume the worst? Of course, the chances of this occurring would only seem to increase if the United States was already involved in some sort of limited armed conflict with Russia and/or China, or if they were confronting each other from a distance in a proxy war, as unlikely as these developments may seem at the present time. The reverse might well apply too: should a nuclear terrorist attack occur in Russia or China during a period of heightened tension or even limited conflict with the United States, could Moscow and Beijing resist the pressures that might rise domestically to consider the United States as a possible perpetrator or encourager of the attack? Washington’s early response to a terrorist nuclear attack on its own soil might also raise the possibility of an unwanted (and nuclear aided) confrontation with Russia and/or China. For example, in the noise and confusion during the immediate aftermath of the terrorist nuclear attack, the U.S. president might be expected to place the country’s armed forces, including its nuclear arsenal, on a higher stage of alert. In such a tense environment, when careful planning runs up against the friction of reality, it is just possible that Moscow and/or China might mistakenly read this as a sign of U.S. intentions to use force (and possibly nuclear force) against them. In that situation, the temptations to preempt such actions might grow, although it must be admitted that any preemption would probably still meet with a devastating response. As part of its initial response to the act of nuclear terrorism (as discussed earlier) Washington might decide to order a significant conventional (or nuclear) retaliatory or disarming attack against the leadership of the terrorist group and/or states seen to support that group. Depending on the identity and especially the location of these targets, Russia and/or China might interpret such action as being far too close for their comfort, and potentially as an infringement on their spheres of influence and even on their sovereignty. One far-fetched but perhaps not impossible scenario might stem from a judgment in Washington that some of the main aiders and abetters of the terrorist action resided somewhere such as Chechnya, perhaps in connection with what Allison claims is the “Chechen insurgents’ … long-standing interest in all things nuclear.”42 American pressure on that part of the world would almost certainly raise alarms in Moscow that might require a degree of advanced consultation from Washington that the latter found itself unable or unwilling to provide.There is also the question of how other nuclear-armed states respond to the act of nuclear terrorism on another member of that special club. It could reasonably be expected that following a nuclear terrorist attack on the United States, both Russia and China would extend immediate sympathy and support to Washington and would work alongside the United States in the Security Council. But there is just a chance, albeit a slim one, where the support of Russia and/or China is less automatic in some cases than in others. For example, what would happen if the United States wished to discuss its right to retaliate against groups based in their territory? If, for some reason, Washington found the responses of Russia and China deeply underwhelming, (neither “for us or against us”) might it also suspect that they secretly were in cahoots with the group, increasing (again perhaps ever so slightly) the chances of a major exchange. If the terrorist group had some connections to groups in Russia and China, or existed in areas of the world over which Russia and China held sway, and if Washington felt that Moscow or Beijing were placing a curiously modest level of pressure on them, what conclusions might it then draw about their culpability? If Washington decided to use, or decided to threaten the use of, nuclear weapons, the responses of Russia and China would be crucial to the chances of avoiding a more serious nuclear exchange. They might surmise, for example, that while the act of nuclear terrorism was especially heinous and demanded a strong response, the response simply had to remain below the nuclear threshold. It would be one thing for a non-state actor to have broken the nuclear use taboo, but an entirely different thing for a state actor, and indeed the leading state in the international system, to do so. If Russia and China felt sufficiently strongly about that prospect, there is then the question of what options would lie open to them to dissuade the United States from such action: and as has been seen over the last several decades, the central dissuader of the use of nuclear weapons by states has been the threat of nuclear retaliation. If some readers find this simply too fanciful, and perhaps even offensive to contemplate, it may be informative to reverse the tables. Russia, which possesses an arsenal of thousands of nuclear warheads and that has been one of the two most important trustees of the non-use taboo, is subjected to an attack of nuclear terrorism. In response, Moscow places its nuclear forces very visibly on a higher state of alert and declares that it is considering the use of nuclear retaliation against the group and any of its state supporters. How would Washington view such a possibility? Would it really be keen to support Russia’s use of nuclear weapons, including outside Russia’s traditional sphere of influence? And if not, which seems quite plausible, what options would Washington have to communicate that displeasure? If China had been the victim of the nuclear terrorism and seemed likely to retaliate in kind, would the United States and Russia be happy to sit back and let this occur? In the charged atmosphere immediately after a nuclear terrorist attack, how would the attacked country respond to pressure from other major nuclear powers not to respond in kind? The phrase “how dare they tell us what to do” immediately springs to mind. Some might even go so far as to interpret this concern as a tacit form of sympathy or support for the terrorists. This might not help the chances of nuclear restraint. FN 40. One way of reducing, but probably not eliminating, such a prospect, is further international cooperation on the control of existing fissile material holdings.

### 1AC Water Adv (Yes War)

#### Continued increases in U.S. corn-ethanol production will drain the Ogallala Aquifer—causing massive water shortages

Specht 13

[Jonathan-J.D. Wash. U St. Louis, Legal Advisor, “Raising Cane: Cuban Sugarcane Ethanol’s Economic and Environmental Effects on the United States,” Environmental Law & Policy Journal, Univ. of California Davis, Vol. 36:2, <http://environs.law.ucdavis.edu/issues/36/2/specht.pdf>]

Increased water consumption is another environmental consequence resulting from the expansion of corn production in Great Plains states. The approximate line dividing the portion of the United States that requires irrigation for agriculture and the portion that has sufficient rainfall for non-irrigated agriculture, the 100th Meridian West of longitude, n101 runs through the Dakotas and Nebraska. Therefore, unlike agriculture in the states that form the center of the Corn Belt, Iowa and Illinois, n102 agriculture in Nebraska and the Dakotas depends to significant degree upon irrigation. The difference in water consumption between the corn growers of Nebraska, on one hand, and those of Iowa and Illinois, on the other, is dramatic. In 2007, of 9,192,656 acres of total corn production in Nebraska, 5,839,067 acres were irrigated, representing 63% of the total acreage. n103¶ This fact is particularly significant because much of Nebraska gets its water from the Ogallala Aquifer, a resource of vital environmental and economic importance to the United States that stretches from Texas to South Dakota. n104 Aquifers n105 continue to provide water as long as the amount of water that flows into them exceeds the amount of water that is withdrawn. If the amount of water withdrawn from an aquifer exceeds the amount of water that recharges an aquifer, however, the aquifer will be depleted. Completely depleting the Ogallala Aquifer would have devastating consequences for the United States. Losing the ability to irrigate land from the Ogallala Aquifer would cause $ 20 billion worth of agricultural losses, and re-filling the aquifer would take 6,000 years. n106 Because the industry encourages increased corn production in areas irrigated with water from the Ogallala Aquifer, the depletion of this aquifer must [\*189] be counted as another detrimental environmental effect of the domestic corn-based ethanol industry.¶ As damning as the list of environmental consequences of the domestic corn-based ethanol industry may seem, advocates for the industry will point out that the gasoline replaced by corn-based ethanol comes with its own set of dramatic consequences, environmental and otherwise: carbon emissions, pollution from petroleum refining, and dependence on unstable foreign regimes. n107 This is certainly true, n108 and any fair evaluation of whether or not the domestic corn-based ethanol industry is a worthy endeavor must consider all these factors. However, the question of whether corn-based ethanol or petroleum-based gasoline is the least environmentally harmful fuel source for the United States is a false dichotomy - or at least it would be if U.S. law and policy were changed to encourage the importation of sugarcane-based ethanol.

#### Incorporating water policy critical to check future shortages – risk conflict and disease spread

Roberta Mann (Dean’s Distinguished Faculty Fellow, and Professor of Law, University of Oregon) July 2010 “Like Water for Energy: The Water-Energy Nexus Through the Lens of Tax Policy”, The Selected Works of Roberta F. Mann, <http://works.bepress.com/cgi/viewcontent.cgi?article=1005&context=roberta_mann>]

Water is essential for life.¶ 4¶ Inadequate potable water supplies lead to poverty, disease, ¶ starvation, and civil strife. Available surface water supplies have not increased in 20 ¶ years, and groundwater tables and supplies are dropping at an alarming rate. “Humanity ¶ presently uses an estimated 26 percent of total terrestrial evapotranspiration and 54 ¶ percent of runoff that is geographically and temporally accessible.”¶ 5¶ New ecological ¶ water demands and changing climate could reduce available freshwater supplies even ¶ more.¶ 6¶ Climate change is likely to put more pressure on the world’s supply of fresh ¶ water.¶ 7¶ Rising sea levels will introduce salt into some fresh water systems. As high mountain snow cover and glaciers decline, they will store less fresh water. As regions ¶ heat up, droughts will become more persistent.¶ 8¶ ¶ Water and energy are inextricably linked. We use energy to produce water – for food and ¶ human consumption. Energy limitations affect water policy, and water limitations should ¶ affect energy choices.¶ 9¶ We use water to produce energy for industry, electricity and ¶ transportation. Making electricity from coal or nuclear energy uses water. Depending on ¶ the source of the electricity, plug-in hybrid vehicle technology may increase water ¶ consumption. However, some renewable fuel sources, like biomass and ethanol, are even ¶ more water intensive. Energy and water policies are rarely coordinated.¶ 10¶ The challenge ¶ of climate change adds more complexity to the water-energy interaction. ¶ Climate change and energy security concerns stimulated government action towards ¶ renewable energy sources and away from traditional fossil energy sources. Yet in the ¶ rush to transition to a renewable energy economy, policy makers have paid little heed to ¶ the potential water consequences.¶ 11¶ Reducing greenhouse gas (GHG) emissions to ¶ mitigate climate change will not help society if production of alternative energy sources ¶ causes a significant water shortage. The government has a number of policy tools ¶ available to encourage GHG reductions. It could regulate emissions, it could make ¶ carbon intensive fuel sources more expensive by imposing a carbon tax or implementing ¶ a cap-and-trade system, or it can make alternative energy sources less expensive by ¶ subsidizing them, either directly or through tax reductions. For the most part, the U.S. government uses the subsidy alternative for its energy policy.¶ 12¶ It provides a majority of ¶ its support for energy through tax incentives rather than through direct government¶ expenditures.¶ 13¶ If the government is going to pick winners by designating certain energy ¶ technologies as worthy of tax incentives, it should consider water consumption as well as ¶ potential for reduced CO2 emissions.

#### Food insecurity is a conflict escalator--most probable scenario for nuclear war

Future Directions International ’12 (“International Conflict Triggers and Potential Conflict Points Resulting from Food and Water Insecurity Global Food and Water Crises Research Programme”, May 25, <http://www.futuredirections.org.au/files/Workshop_Report_-_Intl_Conflict_Triggers_-_May_25.pdf>, )

There is a growing appreciation that the conflicts in the next century will most likely be fought over a lack of resources. Yet, in a sense, this is not new. Researchers point to the French and Russian revolutions as conflicts induced by a lack of food. More recently, Germany’s World War Two efforts are said to have been inspired, at least in part, by its perceived need to gain access to more food. Yet the general sense among those that attended FDI’s recent workshops, was that the scale of the problem in the future could be significantly greater as a result of population pressures, changing weather, urbanisation, migration, loss of arable land and other farm inputs, and increased affluence in the developing world. In his book, Small Farmers Secure Food, Lindsay Falvey, a participant in FDI’s March 2012 workshop on the issue of food and conflict, clearly expresses the problem and why countries across the globe are starting to take note. . He writes (p.36), “…if people are hungry, especially in cities, the state is not stable – riots, violence, breakdown of law and order and migration result.” “Hunger feeds anarchy.” This view is also shared by Julian Cribb, who in his book, The Coming Famine, writes that if “large regions of the world run short of food, land or water in the decades that lie ahead, then wholesale, bloody wars are liable to follow.” He continues: “An increasingly credible scenario for World War 3 is not so much a confrontation of super powers and their allies, as a festering, self-perpetuating chain of resource conflicts.” He also says: “The wars of the 21st Century are less likely to be global conflicts with sharply defined sides and huge armies, than a scrappy mass of failed states, rebellions, civil strife, insurgencies, terrorism and genocides, sparked by bloody competition over dwindling resources.” As another workshop participant put it, people do not go to war to kill; they go to war over resources, either to protect or to gain the resources for themselves. Another observed that hunger results in passivity not conflict. Conflict is over resources, not because people are going hungry. A study by the International Peace Research Institute indicates that where food security is an issue, it is more likely to result in some form of conflict. Darfur, Rwanda, Eritrea and the Balkans experienced such wars. Governments, especially in developed countries, are increasingly aware of this phenomenon. The UK Ministry of Defence, the CIA, the US Center for Strategic and International Studies and the Oslo Peace Research Institute, all identify famine as a potential trigger for conflicts and possibly even nuclear war.

#### Food crisis causes destabilizes Russia, china, and india

Global Torchlight, (Global Torchlight, specialised consultancy advising on a full spectrum of international political and security issues, founding members include John C. Amble, former intelligence officer at the Defense Intelligence Agency, and David J. Chmiel, MA from the War Studies Department at King’s College London, "Drought, Rising Food Prices, and Political Instability," 8--20--12, http://globaltorchlight.com/?p=2289, accessed 11-6-12.

Adverse climatic conditions this year in regions such as the United States, the Black Sea, and India are combining to generate lower than average crop yields and put upward pressure on food prices that will last well into 2013. While those with international business interests will be attuned to the economic and financial consequences of such price increases, equal attention should be paid to their potential impact on the political and security risk environment in emerging and developing markets over the coming months. Such risks could take many forms, but three warrant particular mention. First, substantial and sustained rises in food prices are likely to place pressure on governments in many emerging markets to subsidise the prices of staple foods. As has been noted in previous analysis on globaltorchlight.com, such subsidies often do more harm than good to an economy in the long run. They distort market mechanisms and give rise to increased potential for fraud and corruption in how the program is administered. Nevertheless, when confronted with prospects of civil unrest relating to rising food prices, political leaders may judge subsidies the easiest means of placating a restive population. Second, this will also mean that existing subsidy programs will likely remain in place while food prices continue to rise. In the past couple of years, countries as disparate as Bolivia, Nigeria, and Tunisia have experienced civil unrest following decisions to reduce or eliminate subsidies on food, fuel, and other staples. The prospects of similar disruption to internal security will be fresh in the minds of many governments. Countries that do choose to abolish subsidies are likely to confront considerable resistance when doing so. Finally, the effects of this issue are not limited to smaller developing economies but **could generate political upheaval in** some of the world’s most important economies, including **China, Russia, and India.** It is widely acknowledged that food price inflation is an issue of significant political sensitivity in China and any sustained increase in food prices could cause grave concern in China’s Communist government. In Russia, similar inflationary trends could impact hardest upon the rural and poorer parts of the country on which President Vladimir Putin traditionally relies for support. Protest movements against Putin have previously lacked momentum due to his ongoing support in Russia’s hinterland; however, an erosion in support for his government in those parts of the country could alter that dynamic. However, the potential consequences of food price insecurity would perhaps be most deeply problematic for India, whose government is already struggling with the challenge of restoring order following the eruption of sectarian violence in the north-eastern Assam state. Any civil unrest related to rising food prices would present the government with a further substantial challenge to its attempts to sustain the country’s economic growth and attract further foreign investment capital.

#### Russian instability causes global nuclear war

Dimitri Simes, Senior Associate, Carnegie Endowment for International Peace, “The Return of Russian History,” FOREIGN AFFAIRS, January/February 1994, p. 67+, LN.

For the United States, neither Yeltsin's political future nor even the future of Russian democracy should be ends in themselves. What the United States needs most in its greatly weakened but still potentially formidable superpower rival is a combination of domestic stability and a system of checks and balances.Stability is important for a nation with thousands of nuclear weapons and continuing territorial tensions with its newly independent neighbors. Too much disunity in Russia (as appealing as it is to those who "love" that country so much that they would prefer to see several Russias) increases the likelihood of a civil war that could easily engulf most, if not all, of the post-Soviet states, creating not only nuclear and environmenta ldisasters but a grave threat to world peace as well. Thus, it is in the U.S. interest to have a government in Moscow that is strong and determined enough to draw the line and to prevent centrifugal, separatist trends from going out of control.Conversely, the more stable the Russian government, the more the United States should be interested in seeing that there are meaningful checks and balances to prevent the reemergence of a unitary authoritarian state. Without such checks and balances, there would be no assurance that Russia would not again become a threat to its neighbors and a destabilizing factor in world politics. The United States has a vested interest in seeing Russian governments rely more on democratic legitimacy than on the support of the military and security services.

#### china instability causes nuke war

Herbert Yee ‘2, Assc. Prof. Government @ Hong Kong Baptist University and Ian Storey, Asst. Prof. @ the Asian-Pacific Center for Security Studies, ‘2 (China Threat: Perception, Myths and Reality, p. 5)

The fourth factor contributing to the perception of a China threat is the fear of political and economic collapse in the PRC, resulting in territorial fragmentation, civil war and waves of refugees pouring into neighbouring countries. Naturally, any or all of these scenarios would have a profoundly negative impact on regional stability. Today the Chinese leadership faces a raft of internal problems, including the increasing political demands of its citizens, a growing population, a shortage of natural resources and a deterioration in the natural environment caused by rapid industrialisation and pollution. These problems are putting a strain on the central government’s ability to govern effectively. Political disintegration or a Chinese civil war might result in millions of Chinese refugees seeking asylum in neighbounng countries. Such an unprecedented exodus of refugees from a collapsed PRC would no doubt put a severe strain on the limited resources of China’s neighbours. A fragmented China could also result in another nightmare scenario — nuclear weapons falling into the hands of irresponsible local provincial leaders or warlords.12 From this perspective, a disintegrating China would also pose a threat to its neighbours and the world.

#### independently price spike kills billions

Brown 05 [Lester Brown, President – Earth Policy Institute, ‘05, People and the Planet, “Falling Water Tables 'Could Hit Food Supply'”, 2-7 http://www.peopleandplanet.net/doc.php?id=2424]

Many Americans see terrorism as the principal threat to security, but for much of humanity, the effect of water shortages and rising temperatures on food security are far more important issues. For the 3 billion people who live on 2 dollars a day or less and who spend up to 70 per cent of their income on food, even a modest rise in food prices can quickly become life-threatening. For them, it is the next meal that is the overriding concern."

#### And, Starvation is the biggest impact—intense suffering and kills millions

Holman 99 Susan, The Hungry Body: Famine, Poverty, and Identity in Basil’s Hom.Journal of Early Christian Studies 7:3, 337–363 © 1999 The Johns Hopkins University Press. Project Muse

Hunger, by which I here mean an acutely perceived physical need for food,14determines bodily processes perhaps more than any other characteristic of poverty. Further, hunger may shape not only the physical body of starving individuals but also the interactive dynamics of the starving group in the larger social body of the community.15 Whether famine in Cappadocia was rare or not, Basil implies in Hom. 8 that mortality from starvation was soon a serious and visible problem. The famine hunger Basil depicts is, as he sees it, the supreme human calamity, a more miserable end than all other deaths. For when one considers other life-threatening calamities, the sword brings a quick end; fire too extinguishes life shortly; and also wild beasts, as they rend the limbs apart with their teeth inflict fatal wounds which assure that distress will not be prolonged. But famine is a slow evil, always approaching, always holding off like a beast in its den. The heat of thebody cools. The form shrivels. Little by little strength diminishes. Flesh stretches across the bones like a spider web. The skin loses its bloom, as the rosy appearance fades and blood melts away. Nor is the skin white but rather it withers into black. . . . The knees no longer support but drag themselves by force, the voice is powerless . . . eyes sunken as if in a casket, like dried-up nuts in their shells; the empty belly collapsed, conforming itself to the shape of the backbone without any natural elasticity of the bowels. The person who rushes by such a body, how greatly worthy is he of chastisement? What excess of cruelty will he allow? Should he not be reckoned with the savagery of the beasts, accursed and a homicide?16 This involuntary starvation effects a different set of individual and social dynamics from what one finds in ascetic fasting, that individual choice undertaken for personal spiritual benefit. The starvation that results from famine and food shortage is at odds with individualwill. While the ascetic choice is perceived as empowering, involuntary starvation effects dependence, self-destruction, and suffering for the entire social network, household, and family of those affected by such poverty and hunger. Where voluntary hunger constructs an ideal body, involuntary hunger destroys it. Basil’s sermon explores the long-term implications of this corporate destruction and its roots in injustice, a lack of power over both environmental and social forces.

### 1AC Cuban Economy Adv (Yes War)

#### Sugar industry is key to multiple sectors of the Cuban economy

Alonso-Pippo et al. 8

[Walfrido Alonso-Pippo- former Vice-President of the Solar Energy Department at the University of Havana and a former member of the Cuban National Renewable Energies Front, where he was a specialist in biomass energy use, Carlos A. Luengo, John Koehlinger, Pierto Garzone, Giacinto Cornacchia, “Sugarcane energy use: The Cuban case,” Energy Policy, Vol. 36, Issue 6, June 2008, <http://www.sciencedirect.com/science/article/pii/S0301421508000840>]

While the biggest impact of the reduction in sugar production was felt directly in the sugarcane agro-industry, because of the size and influence of the sugar industry on the Cuban economy, almost all industrial services, not to mention the overall Cuban economy, were affected. For example, the sugar agro-industry is the main customer of Cuba's iron–steel and mechanical industries. Reductions in sugar production led to corresponding reductions in these industries, reducing or paralyzing production at several mechanical plants. The knock-on effects of the decline of the sugar industry are reflected in the Cuban Gross Domestic Product (GDP), which, in per capita terms, was 18% lower in 2001 than in 1989 ([Mesa-Lago, 2007](http://www.sciencedirect.com/science/article/pii/S0301421508000840#bib34)).¶ Sugarcane is a fundamental part of Cuban culture and tradition. It has been said that the emergence of Cuban nationalism in the 19th century began with the sounding of the bells of a sugar mill. For centuries rural life in Cuba was centered around the sugar mill in small towns called “bateyes” ([Moreno-Fraginals, 1978](http://www.sciencedirect.com/science/article/pii/S0301421508000840#bib37)). In the “batey” there were commercial stores selling food, bars, cafeterias, medical clinics, schools, and clubs for entertainment, barber shops, beauty parlors and transport for communication with the cities. When 85 sugar mills were shut down, it is easy to imagine how the lives of thousands of families in these rural communities were affected. Addressing the downsizing of the Cuban sugar industry, Cuban President Fidel Castro repudiated the oft-quoted popular saying in Cuba that “Without sugar there is no country,” calling the slogan “a myth.” One can imagine the deep frustration this declaration caused in the thousands of out-of-work sugar workers who all their working life had been instilled to believe that their labor was integral to the country's economic growth.¶ The shutdown of long-operating sugar mills and the massive dislocation of employees in the sugar industry was accompanied by wide-scale looting of the deactivated mills. The Cuban authorities have acknowledged the significant increase of social corruption in all sectors of the economy, but in the sugar sector it is astonishing. Practically all of the closed sugar factories were plundered; parts, pieces of roofs, walls, hydraulic and sanitary facilities—anything which could be used—was stripped and carted away ([Fig. 7](http://www.sciencedirect.com/science/article/pii/S0301421508000840#fig7)).

#### Sugar spurs innovation and has massive potential to grow Cuba’s economy

Alonso-Pippo et al. 8

[Walfrido Alonso-Pippo- former Vice-President of the Solar Energy Department at the University of Havana and a former member of the Cuban National Renewable Energies Front, where he was a specialist in biomass energy use, Carlos A. Luengo, John Koehlinger, Pierto Garzone, Giacinto Cornacchia, “Sugarcane energy use: The Cuban case,” Energy Policy, Vol. 36, Issue 6, June 2008, <http://www.sciencedirect.com/science/article/pii/S0301421508000840>]

In 2001, tourism's role in the Cuban economy in terms of gross earnings surpassed that from sugar. However, sugar still offered a far better cost/benefit ratio than tourism. Relying on imported services and materials, including food, the cost/benefit ratio for the Cuban tourist industry, expressed in US dollars, was $0.78/$1.00, while in the sugar sector, the ratio was $0.20/$1.00.¶ Furthermore, sugar employs three times as many people as tourism. And the development of the sugar industry would spur growth in broad sectors of the Cuban economy, compared to tourism, which represents a more self-contained sector of the Cuban economy.¶ Lastly, while tourism generates hard currency, it does nothing to spur technological development. Indeed, while the government has made considerable effort to develop the Cuban tourism industry, the knowledge of thousands of well-educated university researchers specializing in sugarcane agriculture, sugar production, and bioenergy development remains untapped. As a result, the morale of these specialists, some of whom have now waited for over 40 years for the government to make good on its promise to bring about the country's economic and social development, is quite low.

#### Cuban instability collapse causes Latin American instability and terror attacks

Gorrell ‘5 (Tim, Lieutenant Colonel, “CUBA: THE NEXT UNANTICIPATED ANTICIPATED STRATEGIC CRISIS?” 3/18/5, <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA433074>)

Regardless of the succession, under the current U.S. policy, Cuba’s problems of a post Castro transformation only worsen. In addition to Cubans on the island, there will be those in exile who will return claiming authority. And there are remnants of the dissident community within Cuba who will attempt to exercise similar authority. A power vacuum or absence of order will create the conditions for instability and civil war. Whether Raul or another successor from within the current government can hold power is debatable. However, that individual will nonetheless extend the current policies for an indefinite period, which will only compound the Cuban situation. When Cuba finally collapses anarchy is a strong possibility if the U.S. maintains the “wait and see” approach. The U.S. then must deal with an unstable country 90 miles off its coast. In the midst of this chaos, thousands will flee the island. During the Mariel boatlift in 1980 125,000 fled the island.26 Many were criminals; this time the number could be several hundred thousand fleeing to the U.S., creating a refugee crisis.¶ Equally important, by adhering to a negative containment policy, the U.S. may be creating its next series of transnational criminal problems. Cuba is along the axis of the drug-trafficking flow into the U.S. from Columbia. The Castro government as a matter of policy does not support the drug trade. In fact, Cuba’s actions have shown that its stance on drugs is more than hollow rhetoric as indicated by its increasing seizure of drugs – 7.5 tons in 1995, 8.8 tons in 1999, and 13 tons in 2000.27 While there may be individuals within the government and outside who engage in drug trafficking and a percentage of drugs entering the U.S. may pass through Cuba, the Cuban government is not the path of least resistance for the flow of drugs. If there were no Cuban restraints, the flow of drugs to the U.S. could be greatly facilitated by a Cuba base of operation and accelerate considerably.¶ In the midst of an unstable Cuba, the opportunity for radical fundamentalist groups to operate in the region increases. If these groups can export terrorist activity from Cuba to the U.S. or throughout the hemisphere then the war against this extremism gets more complicated. Such activity could increase direct attacks and disrupt the economies, threatening the stability of the fragile democracies that are budding throughout the region. In light of a failed state in the region, the U.S. may be forced to deploy military forces to Cuba, creating the conditions for another insurgency. The ramifications of this action could very well fuel greater anti-American sentiment throughout the Americas. A proactive policy now can mitigate these potential future problems.¶ U.S. domestic political support is also turning against the current negative policy. The Cuban American population in the U.S. totals 1,241,685 or 3.5% of the population.28 Most of these exiles reside in Florida; their influence has been a factor in determining the margin of victory in the past two presidential elections. But this election strategy may be flawed, because recent polls of Cuban Americans reflect a decline for President Bush based on his policy crackdown. There is a clear softening in the Cuban-American community with regard to sanctions. Younger Cuban Americans do not necessarily subscribe to the hard-line approach. These changes signal an opportunity for a new approach to U.S.-Cuban relations. (Table 1)¶ The time has come to look realistically at the Cuban issue. Castro will rule until he dies. The only issue is what happens then? The U.S. can little afford to be distracted by a failed state 90 miles off its coast. The administration, given the present state of world affairs, does not have the luxury or the resources to pursue the traditional American model of crisis management. The President and other government and military leaders have warned that the GWOT will be long and protracted. These warnings were sounded when the administration did not anticipate operations in Iraq consuming so many military, diplomatic and economic resources. There is justifiable concern that Africa and the Caucasus region are potential hot spots for terrorist activity, so these areas should be secure. North Korea will continue to be an unpredictable crisis in waiting. We also cannot ignore China. What if China resorts to aggression to resolve the Taiwan situation? Will the U.S. go to war over Taiwan? Additionally, Iran could conceivably be the next target for U.S. pre-emptive action. These are known and potential situations that could easily require all or many of the elements of national power to resolve. In view of such global issues, can the U.S. afford to sustain the status quo and simply let the Cuban situation play out? The U.S. is at a crossroads: should the policies of the past 40 years remain in effect with vigor? Or should the U.S. pursue a new approach to Cuba in an effort to facilitate a manageable transition to post-Castro Cuba?

#### That causes nuclear war and extinction

**Manwaring ‘5** – adjunct professor of international politics at Dickinson

(Max G., Retired U.S. Army colonel, Venezuela’s Hugo Chávez, Bolivarian Socialism, and Asymmetric Warfare, October 2005, pg. PUB628.pdf)  
President Chávez also understands that the process leading to state failure is the most dangerous long-term security challenge facing the global community today. The argument in general is that failing and failed state status is the breeding ground for instability, criminality, insurgency, regional conflict, and terrorism. These conditions breed massive humanitarian disasters and major refugee flows. They can host “evil” networks of all kinds, whether they involve criminal business enterprise, narco-trafficking, or some form of ideological crusade such as *Bolivarianismo.* More specifically, these conditions spawn all kinds of things people in general do not like such as murder, kidnapping, corruption, intimidation, and destruction of infrastructure. These means of coercion and persuasion can spawn further human rights violations, torture, poverty, starvation, disease, the recruitment and use of child soldiers, trafficking in women and body parts, trafficking and proliferation of conventional weapons systems and WMD, genocide, ethnic cleansing, warlordism, and criminal anarchy. At the same time, these actions are usually unconfined and spill over into regional syndromes of poverty, destabilization, and conflict.62 Peru’s *Sendero Luminoso* calls violent and destructive activities that facilitate the processes of state failure “armed propaganda.” Drug cartels operating throughout the Andean Ridge of South America and elsewhere call these activities “business incentives.” Chávez considers these actions to be steps that must be taken to bring about the political conditions necessary to establish Latin American socialism for the 21st century.63 Thus, in addition to helping to provide wider latitude to further their tactical and operational objectives, state and nonstate actors’ strategic efforts are aimed at progressively lessening a targeted regime’s credibility and capability in terms of its ability and willingness to govern and develop its national territory and society. Chávez’s intent is to focus his primary attack politically and psychologically on selected Latin American governments’ ability and right to govern. In that context, he understands that popular perceptions of corruption, disenfranchisement, poverty, and lack of upward mobility limit the right and the ability of a given regime to conduct the business of the state. Until a given populace generally perceives that its government is dealing with these and other basic issues of political, economic, and social injustice fairly and effectively, instability and the threat of subverting or destroying such a government are real.64 But failing and failed states simply do not go away. Virtually anyone can take advantage of such an unstable situation. The tendency is that the best motivated and best armed organization on the scene will control that instability. As a consequence, failing and failed states become dysfunctional states, rogue states, criminal states, narco-states, or new people’s democracies. In connection with the creation of new people’s democracies, one can rest assured that Chávez and his Bolivarian populist allies will be available to provide money, arms, and leadership at any given opportunity. And, of course, the longer dysfunctional, rogue, criminal, and narco-states and people’s democracies persist, the more they and their associated problems endanger global security, peace, and prosperity.65

#### Bioterror attacks would target the US

Bryan ‘1 (Anthony T. Bryan, director of the North-South Center’s Caribbean Program, 10-21-2001. CFR, Terrorism, Porous Borders, and Homeland Security: The Case for U.S.-Caribbean Cooperation, p.  
<http://www.cfr.org/publication/4844/terrorism_porous_borders_and%20_homeland_%20security.html>)

Terrorist acts can take place anywhere. The Caribbean is no exception. Already the linkages between drug trafficking and terrorism are clear in countries like Colombia and Peru, and such connections have similar potential in the Caribbean. The security of major industrial complexes in some Caribbean countries is vital. Petroleum refineries and major industrial estates in Trinidad, which host more than 100 companies that produce the majority of the world’s methanol, ammonium sulphate, and 40 percent of U.S. imports of liquefied natural gas (LNG), are vulnerable targets. Unfortunately, as experience has shown in Africa, the Middle East, and Latin America, terrorists are likely to strike at U.S. and European interests in Caribbean countries. Security issues become even more critical when one considers the possible use of Caribbean countries by terrorists as bases from which to attack the United States. An airliner hijacked after departure from an airport in the northern Caribbean or the Bahamas can be flying over South Florida in less than an hour. Terrorists can sabotage or seize control of a cruise ship after the vessel leaves a Caribbean port. Moreover, terrorists with false passports and visas issued in the Caribbean may be able to move easily through passport controls in Canada or the United States. (To help counter this possibility, some countries have suspended "economic citizenship" programs to ensure that known terrorists have not been inadvertently granted such citizenship.) Again, Caribbean countries are as vulnerable as anywhere else to the clandestine manufacture and deployment of biological weapons within national borders.

#### Extinction

STEINBRUNER ’97 - Brookings senior fellow and chair in international security, vice chair of the committee on international security and arms control of the National Academy of Sciences (John D. Steinbruner, Winter 1997, Foreign Policy, “Biological weapons: a plague upon all houses,” n109 p85(12), infotrac)

Although human pathogens are often lumped with nuclear explosives and lethal chemicals as potential weapons of mass destruction, there is an obvious, fundamentally important difference: Pathogens are alive, weapons are not. Nuclear and chemical weapons do not reproduce themselves and do not independently engage in adaptive behavior; pathogens do both of these things. That deceptively simple observation has immense implications. The use of a manufactured weapon is a singular event. Most of the damage occurs immediately. The aftereffects, whatever they may be, decay rapidly over time and distance in a reasonably predictable manner. Even before a nuclear warhead is detonated, for instance, it is possible to estimate the extent of the subsequent damage and the likely level of radioactive fallout. Such predictability is an essential component for tactical military planning. The use of a pathogen, by contrast, is an extended process whose scope and timing cannot be precisely controlled. For most potential biological agents, the predominant drawback is that they would not act swiftly or decisively enough to be an effective weapon. But for a few pathogens - ones most likely to have a decisive effect and therefore the ones most likely to be contemplated for deliberately hostile use - the risk runs in the other direction. A lethal pathogen that could efficiently spread from one victim to another would be capable of initiating an intensifying cascade of disease that might ultimately threaten the entire world population. The 1918 influenza epidemic demonstrated the potential for a global contagion of this sort but not necessarily its outer limit.

### Cuban Economy UQ

#### **Multiple threats to Cuba’s economy risk collapse during the current transition**

Morris ’11 (Emily, London Metropolitan University UK, FORECASTING CUBA’S ECONOMY: 2, 5, AND 20 YEARS, Presented at the international symposium “Cuba Futures: Past and Present,” organized by The Cuba Project Bildner Center for Western Hemisphere Studies at The Graduate Center/CUNY, <http://web.gc.cuny.edu/dept/bildn/cuba/cubaforecasting.pdf>)

Risks in the short term

Political risks arise from the process of transferring leadership from the old guard to a new generation. Evidently conscious of the hazards, the old guard are seeking to closely manage the generational handover, but their control will diminish. So far signs of dissent within the government have been rare and weak, but in 2011 the situation will begin to change radically. At the special conference of the PCC that will take place after the sixth PCC congress in April 2011, it seems likely that a new set of leaders will take up their posts. None of them will have the authority of the Castro brothers, and so for the first time for fifty years there is a possibility of the emergence of factionalism. In the TABLE 5. Two year forecast 2010 2011 2012 Real GDP (% growth) 2.1 3.5 4.2 Inflation (year-end, %)a a. This inflation figure is based on an estimated average household cost of living index that takes into account a reduction in the amount of basic goods available at heavily subsidised prices on the ration. The impact of the shift from subsidised consumption to market prices will vary widely between households, with the percentage rise in the cost of living being greater for those at the lower end of the income scale, who spend a higher proportion of their income on basic goods. 6.3 7.2 5.5 Average labour productivity (% growth) 4.2 5.9 4.5 Government spending/GDP ratio (%) 66.5 63.8 60.4 Investment/GDP ratio (%) 10.5 11.1 12.5Forecasting Cuba’s Economy: 2, 5, and 20 Years 13 context of the rapid changes taking place in the economic sphere, 2012 is likely to be a testing year. Despite its efforts to dampen expectations, there is a sense among the Cuban public that they should see material benefits from the economic reforms. If these hopes are dashed, the government could face a serious crisis of public confidence. In the economic sphere, there are many hazards arising from the process of transformation. There are risks that monetary growth will outstrip that of supply so that inflationary pressures could build, at a time when the government is losing its power to directly control prices. The extent to which the government will be able to manage the fiscal challenge it has set itself—to achieve sufficient savings and raise sufficient tax revenue to maintain welfare provision whilst phasing out the existing apparatus of social protection—will depend on its ability to respond quickly to difficulties as they arise. A major fiscal crisis would jeopardise the reform process, and hamper the government's ability to respond to social pressures created by the extensive realignment of relative incomes that will result from the changes. External risks are heightened by Cuba’s lack of access to emergency financing in the case of unanticipated shocks. The largest single risk comes from Cuba’s high degree of dependency on Venezuela, and in particular on earnings from the export of professional services. Hugo Chávez, on whom the relationship rests, does not face re-election until 2012 but if anything were to befall him before then, the Cuban economy would suffer. The high degree of uncertainty about the global economy also presents risks, with the recovery in OECD countries fragile and signs of strain within the economies of the growth leaders, China and India. 14 C

### Cuban Economy Solvency

#### Sugarmills will generate cheap power in Cuba-it’s a self sustaining industry

Soligo and Jaffe 8

[Ronald Soligo-Scholar at James Baker Institute for Public Policy, Rice Univ., Amy Jaffe-Wallace S. Wilson Fellow in Energy Studies, James A Baker III Institute for Public Policy, Rice Univ., “Energy Balances and the Potential for Biofuels in Cuba,” Cuba’s Energy Future, 2010, kindle]

Ethanol and the Production of Electricity The economics of ethanol production from sugarcane is enhanced by using the sugarcane waste (bagasse) to produce electricity by burning it. One estimate is that Cuban mills produce 20 and 40 kilowatt-hours per ton of sugarcane, depending on the age and efficiency of the steam turbines. 51 This is below the 55 kilowatt-hours reported for plants in Central America and significantly below the 100 kilowatt-hours per ton achieved by some Hawaiian mills. 52 Although bagasse is available only during the harvest season, these plants can be fueled with woodchips and other waste in at least part of the non-harvest season. Even at the modest yield of 55 tons of sugarcane per hectare and 55 kilowatt-hours per ton, a million hectares of sugarcane will produce roughly 3 billion kilowatt-hours of electricity, almost 20 percent of the 16.5 billion kilowatt-hours produced in Cuba in 2006. With higher yields, 1.3 million hectares could produce 4 billion to 5 billion kilowatt-hours.

#### Massive economic potential in Cuban sugar-ethanol

Soligo and Jaffe 8

[Ronald Soligo-Scholar at James Baker Institute for Public Policy, Rice Univ., Amy Jaffe-Wallace S. Wilson Fellow in Energy Studies, James A Baker III Institute for Public Policy, Rice Univ., “Energy Balances and the Potential for Biofuels in Cuba,” Cuba’s Energy Future, 2010, kindle]

Conclusion Our intention in this chapter was to present the case that Cuba's energy potential is sufficient for Cuba to shift from its status as a net importer of roughly 100,000 barrels of oil a day to one of a net energy exporter. We have derived what we feel are conservative estimates of future energy demand and suggest that Cuba's oil production potential alone could probably satisfy future energy demand growth, provided that Cuba begins to do something about its abnormally high energy transformation losses. In addition, we suggest that Cuba could produce upwards of 150 billion cubic feet per day of natural gas, equivalent to 77,000 barrels of oil equivalent per day. Finally, ethanol production of 2 billion gallons per year could replace 94,500 barrels per day of gasoline as well as 3,000 gigawatt-hours of electricity— 18 percent of current Cuban production— through cogeneration. It is not possible to generate estimates of Cuban demand for specific fuels, since Cuba will have a choice of which to use domestically and which to export, depending on the relative prices of various fuels in international markets. But it is clear that Cuba has the potential of being a significant exporter of several energy resources, shifting the country from a nation where energy poverty has negatively affected overall economic performance to a country where energy surpluses could support economic growth. The development of its energy resources could have a profound impact on Cuba's economy. Simply replacing current oil imports would release foreign exchange for other developmental uses. For example, at $ 60 a barrel, 100,000 barrels per day of imports has a market value of $ 2.2 billion a year, roughly equivalent to all the earnings from the tourist industry. 53 Energy exports will add a further significant boost to the Cuban economy. The experience of Brazil is instructive. In the 1970s Brazil found itself facing financial crises when oil prices spiked as a result of Middle East instability. By contrast, Brazil in 2007 and 2008— by then a net exporter of energy— saw less economic hardship arising from the dramatic increase in oil prices than other industrialized countries in those years. Whether the scenarios discussed in this chapter are realistic can be established only when serious oil and natural gas exploration and development of Cuban assets begins. Cuba's nascent potential in ethanol also remains theoretical so far. However, the recent political transition in Cuba and the change in administration in the United States make this an ideal time to reevaluate U.S.-Cuba policy, taking into consideration humanitarian issues as well as energy potential. Having an additional supplier of energy to the U.S. market from only a few miles off shore can only contribute to the United States' energy security.

#### Cuban sugarcane-based ethanol factories are self sufficient

Patino 11 (Christian Santiago Patino, a writer for ASCE, “The Cuban Sugar Dilemma: The Prospect for a Green Future”, The Association for the Study of the Cuban Economy, a non-profit non-political organization that focuses on the elements and processes of a transition to a market democracy in Cuba, 6/13/11, http://www.ascecuba.org/publications/proceedings/volume19/pdfs/patino.pdf//HZ)

Cuba will also have an advantage given its specialization in sugarcane-based ethanol. Among ethanol production methods, the production of sugarcane-based¶ ethanol is the most cost efficient. Ethanol blends made from starches such as potatoes, corn, wheat, or barley are more expensive to produce because before their starch content can be distilled it must first pass through three extra steps. The three steps that must be carried out before starches can be distilled bring about significant costs for starch-based ethanol producers.¶ Additional costs are incurred by starch-based ethanol producers due to the high water requirements in the refining process of starches into simple sugars. Although water has yet to be valued as highly as energy, excessive water usage is yet another unnecessary cost evaded by sugarcane based ethanol producers. In Minnesota, for example, it is estimated that during 2005, corn bio-refineries consumed an average of 4.2 gallons of water for every gallon of ethanol produced (Goettemoeller and Goettemoeller 118).¶ Furthermore, sugarcane-based ethanol benefits greatly from its ability to use leftover bagasse to produce heat and energy. When sugarcane bagasse is burnt, the heat can be used to power the ethanol factories, reducing energy costs. Since only 20 percent of the bagasse is estimated to be needed to power each factory, the rest can be sold onto the electric grid (Goettemoeller and Goettemoeller 149). In today’s competitive world, small cuts in the cost of production will determine which ethanol blends compete in the international market. The recent bankruptcy of VeraSun Energy, a starch based ethanol producer and the second largest ethanol producer in the United States, reflects the difficulty that starch based ethanol producers have to manufacture ethanol at a competitive price.¶ Today’s low sugarcane yields should not discourage the development of Cuba’s prospective ethanol sector; instead, it is important that investors embrace long time horizons. Cuba possess the ideal conditions for sugarcane cultivation — with time and good harvesting practices, production yields should increase to a competitive level. This expected rise in production is what will make Cuban ethanol an enticing business; and Cuba’s modern transportation networks and highly experienced labor force will complement this process.

#### Sugarcane ethanol production improves the economy – empirics prove

UNICA 10 (UNICA, the leading trade association for the sugarcane industry in Brazil, “Economic Growth”, Sweeter Alternative, a web site developed by UNICA that focuses on renewable energy options, 2/3/10, http://sweeteralternative.com/economic-advantages?utm\_source=internal&utm\_medium=mainnav&utm\_campaign=website//HZ)

Increasing sugarcane production and processing would not only enhance energy security and improve the environment. It would also contribute significantly to economic growth and development.¶ More than 100 tropical countries – many of them needing expanded economic opportunities – grow sugarcane and could build upon Brazil’s successful experience. The sugarcane industry is an important segment of the country’s economy. The industry includes cultivation, processing and refined products. Take a look at how the sector has contributed to the country's economy:¶ In 2010, the sugarcane sector contributes US$50 billion to Brazil’s gross domestic product (GDP) – equivalent to almost 2.4% of the entire Brazilian economy and comparable to the GDP of a European country like Slovenia (US$47.7 billion).¶ When you add in the various suppliers and stakeholders who depend on Brazil’s sugarcane industry, the entire sugarcane agro-industrial system generates gross revenues totaling more than US$86 billion annually.¶ The sugarcane industry employs 1.28 million workers, according to 2008 data from the Ministry of Labor and Employment’s Annual Report of Social Information (RAIS).¶ Salaries for sugarcane industry workers are among the highest in Brazil’s agricultural sector, second only to wages in the soybean industry.¶ In 2008, sugarcane workers employed in Brazil’s South-Central region (the country’s main cane-producing zone) earned an average monthly income of R$1,062.55, while in the North-Northeast region the average was R$666.20.¶ For context, the national average monthly salary amounted to R$942.02 that year, and the minimum was R$ 415.00.¶ Between 2005 and 2009, the Brazilian sugarcane industry expanded at a rate of 10% annually. During that period, more than 100 new mills began operation thanks to total investments of US$20 billion.¶ However, the sector was severely impacted by the 2008 global financial crisis. As part of the sector’s restructuring, the bulk of investments were from mergers and acquisitions rather than new production facilities.¶ Since then, sugarcane production growth has slowed to about 3% per year.¶ Despite challenges facing the industry, experts predict Brazil’s sugarcane sector will continue to grow. Ethanol and sugar still contribute the largest economic impact, but new products will add to the sector’s income and become increasingly important. Bioelectricity already represents nearly US$400 million of sugarcane’s contribution to Brazilian GDP and is expected to grow exponentially in coming years. Also keep an eye on innovative products like bioplastics, cellulosic ethanol and biohydrocarbons like sugarcane diesel, which represent important new technological frontiers and offer real promise for the years ahead.

# Inherency Ext.

#### Current attempts at reviving the sugar industry are failing in Cuba

Alonso-Pippo et al. 8

[Walfrido Alonso-Pippo- former Vice-President of the Solar Energy Department at the University of Havana and a former member of the Cuban National Renewable Energies Front, where he was a specialist in biomass energy use, Carlos A. Luengo, John Koehlinger, Pierto Garzone, Giacinto Cornacchia, “Sugarcane energy use: The Cuban case,” Energy Policy, Vol. 36, Issue 6, June 2008, <http://www.sciencedirect.com/science/article/pii/S0301421508000840>]

Beginning during the period from 1994 to 1996, the Cuban government had since made several unsuccessful attempts to revive the Cuban sugarcane agro-industry. Just recently the Cuban authorities declared their intention to return the industry to its historical levels of production with the intent to increase ethanol production (Barroso, 2006; Terrero, 2006). Despite these efforts and declarations, the Cuban sugar industry has continued to decline. Undoubtedly, the decades-long economic and commercial blockade imposed on Cuba by the United States (US) has played an important role in the current condition of the national sugar agro-industry, but the blockade is only one reason among several for the industry's sustained decline.

#### Cuba has reopened its sugar mills but it does not have all the tech and know-how it needs

Sarah Rainsford May 22, 2013 ( Sarah Rainsford, staff writer at BBC, “Cuba’s sugar mills get a new lease of life” may 22, 2013 <http://www.bbc.co.uk/news/world-latin-america-22606943>)

By contrast, there is a fresh buzz of activity in Mejico.¶ In the nearby fields, workers have been rushing to cut the cane before the weather turns. A shiny new Brazilian harvester charges forward, swallowing up the cane as it goes.¶ Cuba has invested in some new equipment to kickstart its revamped sugar business¶ It is one of four machines Cuba invested in for the mill re-opening, far more efficient than the ageing, Soviet alternative.¶ There have been teething troubles with the re-opening.¶ New machine parts arrived late, the workforce is young and inexperienced, and production is below target. Senior staff have slept little, under pressure to perform.¶ But the whole community is willing this to succeed. Some pensioners are helping out at the mill for free, passing their expertise to a new, young generation.¶ And many sugar workers who took up farming when the mill closed have hung up their spades and returned.¶ "They like the mill. It's a tradition here, more than anything. And it's more secure work, right next to their homes," explains mill director Jesus Perez Collazo.¶ "There are a lot of challenges. The harvest is not as good as we wanted but the country needs to produce sugar, and we can help," he says.¶ China buys 400,000 tonnes of sugar from Cuba a year; now production is increasing, Azcuba says international brokers are also knocking at the door.

#### The U.S. needs to act now or be locked out of the Cuban market, which slows Cuba’s economic and political change

Vicki Huddleston March 10, 2008 ( Vicki Huddleston, In June of 2009 Vicki Huddleston was appointed deputy assistant secretary of defense for Africa at the Department of Defense. She was a visiting fellow at Brookings and co-director of the Brookings Project on U.S. Policy Toward a Cuba in Transition from 2007 to 2009. “Cuba Embargo’s Usefulness Has Run Its Course,” March 10, 2008. <http://www.brookings.edu/research/opinions/2008/03/10-cuba-huddleston>)

But the Bush administration is standing by its policy that Cuba must change first, tying any modification in our unilateral embargo to the end of the Castro regime. This does us and the Cuban people a disservice because it ties our policy to that of Raúl Castro's. By waiting for the Cuban regime to act, we make policy initiatives that would bring about change, dependent on the actions of the Cuban government. The longer we wait the more likely that Cuba's new leaders will manage without us. In three to five years, Cuba, with help from foreign investors, will have exploited deep-sea oil and its sugar cane ethanol, adding billions to its annual revenues and making the island a net exporter of energy. Worse, the longer we wait, the slower the process of change. If we want to play a role in Cuba's future, we must act now to encourage change in Cuba, by the Cuban people.

#### Cuba has the capacity to produce nearly 2 billion gallons of ethanol. All it needs is a revival of its sugar industry

Nicholas Elledge October 29, 2009 (Nicholas Elledge, research fellow at the Council on Hemispheric Affairs. “Cuba’s Sugarcane Ethanol Potential: Cuba, Raul Castro, and the Return of King Sugar to the Island” October 29, 2009. <http://www.coha.org/cubas-sugarcane-ethanol-potential/>)

Cuba’s sugarcane production sharply declined thereafter, from 8.4 million tons in 1990 to 4.2 million only three years later. A blatant lack of efficiency, a series of droughts and hurricanes, as well as an economic crisis led to a fall in average annual production to a mere 3.7 million tons from 1994 to 2003. In 2002 the Castro government, in despair, severely downsized the industry, closing over half of Cuba’s 156 sugar mills in what was called the “Alvaro Reynoso Task.” As a result, production continued to shrink. By 2007-08, the Cuban zafra amounted to a mere 1.5 million tons. Since 2003, in order to fulfill export contracts as well as meet domestic consumption levels estimated at 700,000 tons/year, Cuba unbelievably has had to become a net importer of sugar.¶ Despite its clear deterioration in recent years, a revived Cuban sugar industry could serve an important role in the immediate future by attracting a new tranche of foreign investment while bolstering the country’s failing economy through the production of raw sugar, which would be processed into renewable fuel as well as cogenerate electricity. In fact, Cuba has produced ethanol in the past; when imported oil supplies were drastically curbed during the WWII conflict, Cuba produced roughly 26 million gallons of anhydrous ethanol to blend with gasoline. This practice, however, was discontinued after the war in order to meet U.S. raw sugar import quotas. Today, Juan Tomás Sanchez of the Association for the Study of the Cuban Economy estimates that Cuba eventually could supply up to 3.2 billion gallons of ethanol annually. A more modest prediction by Cuba expert Jorge Hernandez Fonseca projects a production figure around 2 billion gallons per year, which would still make the island the third largest sugar producer in the world, behind the U.S. and Brazil. Regardless, Rivera Ortiz, director of the Cuban business society ZERUS, told business magazine Opciones in 2006 that, “any efforts by foreign and Cuban entrepreneurs to jointly produce ethanol in Cuba must first look at guaranteeing financial and technological resources needed to boost sugarcane production as the necessary raw material for the advancement of ethanol projects.”

#### Cuba wants to develop sugarcane-based power

**Havana Energy 2011** (Havana energy: A British company discovering new energy solutions in Cuba. Biomass Magazine: "Renewable Energy Project Launched in Cuba". <http://biomassmagazine.com/articles/5225/renewable-energy-project-launched-in-cuba>.)

Group of companies—has teamed up with Zerus SA, a company linked to the Ministry of Sugar, to develop a 30-megawatt pilot power plant at Ciro Redondo Sugar Mill, about 400 kilometers (248 miles) from Havana, and use it as a model to develop more power plants. The business will be developed in a joint venture company. **Seven percent of Cuba's energy needs are currently supplied by renewable energy sources. The Cuban government is eager to increase this percentage via its natural resources and reduce the country's dependence on fossil fuels.** “Having tried for more than a decade to promote closer economic links between the U.K. and Cuba, I am delighted to be involved in a project that demonstrates the benefits of such co-operation,” said Havana Energy Chairman Brian Wilson, a former U.K. Energy Minister. “**Cuba has an excellent record both in providing electricity for its people and promoting environmental sustainability.** This project will support both objectives. I have the highest regard for the abilities and objectives of our Cuban colleagues.” The Ministry of Sugar and the National Electricity Board have a strategy to increase power generation in all its operating sugar mills to decentralize the grid and provide power generation in areas which have weaker supply today. **Nelson Labrada, vice-minister of sugar, said: “This strategy of using sugarcane bagasse for power generation avoids one of the primary problems with other biomass sources, which is supply.** Bagasse is the fibrous residual left after cane crushing. **In Cuba it is possible via the sugar mills and bagasse-based power plants to generate up to 40 percent of the energy needs of the country today.”** The capital investment for the pilot plant is expected to provide a return of investment within five years.

#### Cuba pushes sugarcane-based power now

**EFE 2013** (EFE: EFE is the major multimedia news agency in Spanish and the world's fourth largest wire service. Fox News Latino: "Cuba Plans to Build First Biofuel Power Plant." <http://latino.foxnews.com/latino/news/2013/06/16/cuba-plans-to-build-first-biofuel-power-plant/>.)

The power plant will burn the sugarcane residue known as "bagazo," but other wood residues could be used as fuel in the future. "This will be the first bioelectric power plant of its type operating in Cuba and the specialists who will be responsible for running it traveled to China for training," Prensa Latina said. **Large quantities of sugarcane residue are incinerated in Matanzas and the power plant will use this material to produce renewable energy, "providing economic and environmental advantages,**" the news agency said. **The Cuban government has expressed an interest in recent years in increasing electricity production from renewable sources, such as** wood and **sugarcane** biomass, solar, wind and hydraulic **sources.** **Only 3.8 percent of the electricity generated in Cuba currently comes from renewable sources,** but **the island hopes to increase this figure** to 12 percent over the next eight years, officials said. EFE

#### Cuba seeks to increase electricity output through sugarcane

**AFP 2011** (Association of fundraising professionals: "AFP: Cuba to Use Sugar Cane in New Electricity Plant." The association fosters growth of fundraising professionals promotes high ethical standards in the fundraising. <http://www.google.com/hostednews/afp/article/ALeqM5jFzI9dtNHksQwWVIvSSf7eoZoKtg?docId=CNG.ab3b4941ed40505aa51ae2114f0f46c1.a01>.)

The plant, being built in Ciego de Avila province, some 400 kilometers (240 miles) east of Havana, will use "biomass from sugar cane (the residue from agricultural products) and forestry" particularly an invasive hardwood species known as "marabu" which provides good quality charcoal. **Initially the aim is to supply the energy needed to run sugar processing plants**, **an official from the** state Azcuba **sugar group**, Angel Mendez, **told a parliamentary committee. "Increasing the production of sugar and electricity in a parallel fashion is** Azcuba's **top priority**," Granma added. "**The aim is meet 30 percent of the electricity needs" of the country.** In 2005 **Cuba** launched an extensive program to expand and modernize its electricity grid. The plan which hit a setback amid the economic crisis in 2009 **aims to install new generators, replace millions of appliances to ensure they are more energy efficient** and repair power lines.

# Warming Bad

### Warming is Anthropogenic/Real

#### Warming is real, anthropogenic, and happening now

**Braganza 6/14/11** (Karl, Manager, Climate Monitor at the Bureau of Meteorology in Australia, The Bureau presently operates under the authority of the Meteorology Act 1955, which requires it to report on the state of the atmosphere and oceans in support of Australia's social, economic, cultural and environmental goals. His salary is not funded from any external sources or dependent on specially funded government climate change projects. Karl Braganza does not consult to, own shares in or receive funding from any company or organisation that would benefit from this article, and has no relevant affiliations “The greenhouse effect is real: here’s why

,” http://theconversation.edu.au/the-greenhouse-effect-is-real-heres-why-1515,)

In public discussions of climate change, the full range and weight of evidence underpinning the current science can be difficult to find. A good example of this is the role of observations of the climate system over the past one hundred years or more. In the current public discourse, the focus has been mostly on changes in global mean temperature. It would be easy to form the opinion that everything we know about climate change is based upon the observed rise in global temperatures and observed increase in carbon dioxide emissions since the industrial revolution. In other words, one could have the mistaken impression that the entirety of climate science is based upon a single correlation study. In reality, the correlation between global mean temperature and carbon dioxide over the 20th century forms an important, **but very small part of the evidence for a human role in climate change.** Our assessment of the future risk from the continued build up of greenhouse gases in the atmosphere is even less informed by 20th century changes in global mean temperature. For example, our understanding of the greenhouse effect – the link between greenhouse gas concentrations and global surface air temperature – **is based primarily on our fundamental understanding of mathematics, physics, astronomy and chemistry.** **Much of this science is textbook material that is at least a century old and does not rely on the recent climate record**. For example, it is a scientific fact that Venus, the planet most similar to Earth in our solar system, experiences surface temperatures of nearly 500 degrees Celsius due to its atmosphere being heavily laden with greenhouse gases. Back on Earth, that fundamental understanding of the physics of radiation, combined with our understanding of climate change from the geological record, clearly demonstrates that increasing greenhouse gas concentrations will inevitably drive global warming. The observations we have taken since the start of 20th century have confirmed our fundamental understanding of the climate system. While the climate system is very complex, observations have shown that our formulation of the physics of the atmosphere and oceans is largely correct, and ever improving. Most importantly, the observations have confirmed that human activities, in particular a 40% increase in atmospheric carbon dioxide concentrations since the late 19th century, have had a discernible and significant impact on the climate system already. In the field known as detection and attribution of climate change, scientists use indicators known as of climate change. These fingerprints show the entire climate system has changed in ways that are consistent with increasing greenhouse gases and an enhanced greenhouse effect. They also show that recent, long term changes are inconsistent with a range of natural causes. A warming world is obviously the most profound piece of evidence. Here in Australia, the decade ending in 2010 has easily been the warmest since record keeping began, and continues a trend of each decade being warmer than the previous, that extends back 70 years. Globally, significant warming and other changes have been observed across a range of different indicators and through a number of different recording instruments, and a consistent picture has now emerged. Scientists have observed increases in continental temperatures and increases in the temperature of the lower atmosphere. In the oceans, we have seen increases in sea-surface temperatures as well as increases in deep-ocean heat content. That increased heat has expanded the volume of the oceans and has been recorded as a rise in sea-level. Scientists have also observed decreases in sea-ice, a general retreat of glaciers and decreases in snow cover. Changes in atmospheric pressure and rainfall have also occurred in patterns that we would expect due to increased greenhouse gases. There is also emerging evidence that some, though not all, types of extreme weather have become more frequent around the planet. These changes are again consistent with our expectations for increasing atmospheric carbon dioxide. Patterns of temperature change that are uniquely associated with the enhanced greenhouse effect, and which have been observed in the real world include: greater warming in polar regions than tropical regions greater warming over the continents than the oceans greater warming of night time temperatures than daytime temperatures greater warming in winter compared with summer a pattern of cooling in the high atmosphere (stratosphere) with simultaneous warming in the lower atmosphere (troposphere). By way of brief explanation, if the warming over the 20th century were due to some deep ocean process, we would not expect to see continents warming more rapidly than the oceans, or the oceans warming from the top down. For increases in solar radiation, we would expect to see warming of the stratosphere rather than the observed cooling trend. Similarly, greater global warming at night and during winter is more typical of increased greenhouse gases, rather than an increase in solar radiation. There is a range of other observations that show the enhanced greenhouse effect is real. The additional carbon dioxide in the atmosphere has been identified through its isotopic signature as being fossil fuel in origin. The increased carbon dioxide absorbed by the oceans is being recorded as a measured decrease in ocean alkalinity. Satellite measurements of outgoing long-wave radiation from the planet reveal increased absorption of energy in the spectral bands corresponding to carbon dioxide, exactly as expected from fundamental physics. It is important to remember that the enhanced greenhouse effect is not the only factor acting on the climate system. In the short term, the influence of greenhouse gases can be obscured by other competing forces. These include other anthropogenic factors such as increased industrial aerosols and ozone depletion, as well as natural changes in solar radiation and volcanic aerosols, and the cycle of El Niño and La Niña events. By choosing a range of indicators, by averaging over decades rather than years, and by looking at the pattern of change through the entire climate system, scientists are able to clearly discern the fingerprint of human-induced change. The climate of Earth is now a closely monitored thing; from instruments in space, in the deep ocean, in the atmosphere and across the surface of both land and sea. It’s now practically certain that increasing greenhouse gases have already warmed the climate system. That continued rapid increases in greenhouse gases will cause rapid future warming is irrefutable

#### Warming is real and humans are causing it—every real scientist agrees—prefer peer-reviewed data

**EDF 5/5/11** (Environmental Defense Fund,  leading national nonprofit organization representing more than 700,000 members.  Citing Science and the IPCC, as well as other multinational climate organizations, “Scientific Consensus on the Basic Facts of Global Warming

,” http://www.edf.org/article.cfm?contentID=11016,)

**The most respected scientific bodies have stated unequivocally that global warming is occurring, and people are causing it by burning fossil fuels and cutting down forests**. This conclusion is shared by the national science academies of developed and developing countries (statement [PDF]), plus many other organizations, including the Intergovernmental Panel on Climate Change, which was established by the United Nations and the World Meteorological Organization to provide the world with "a clear scientific view" on climate change. The only real debate is about how fast warming will occur, and how much damage will be done, as a result of human activities that produce heat-trapping CO2 and other greenhouse-gas emissions. Peer review ensures sound science Climate scientists, like all scientists, are professional skeptics. They welcome – in fact, rely upon – rigorous challenges to their work from colleagues. Through this process of peer review and independent verification, scientists critique and double- (and triple- and quadruple-) check each other's work. This can lead to debate and controversy, but over time, solid research is validated, errors are discarded, and a body of reliable facts is created. In addition, science advances by focusing on what is not yet known. In the case of climate change, for example, there is an extremely good general understanding of the phenomenon, but many details are not yet understood. These gaps in the research, as they come to light, are systematically tackled by the scientific community. In this context, **the kind of material used by climate-change skeptics to cast doubt on global warming** – whether it be a handful of emails stolen from an East Anglian research facility or a few errors in an IPCC report – **are meaningless.** **The mountain of climate data assembled over decades by the scientific community as a whole is irrefutable.** The records collected and analyzed by independent scientists from many disciplines and thousands of locations, paint a consistent, verifiable picture of a rapidly warming world. Make no mistake: **Science has given us unequivocal warning that global warming is real.** The time to startworking on solutions is now.

### Slowing Rate/Adaptation

#### Slowing the rate is key for adaptation

Romm ’07 [Joseph, Senior Fellow at Center for American Progress, Aug 29, “Hurricane Katrina and the Myth of Global Warming Adaptation,” http://gristmill.grist.org/story/2007/8/29/94352/7786]

If we won't adapt to the realities of having one city below sea level in hurricane alley, what are the chances we are going to adapt to the realities of having all our great Gulf and Atlantic Coast cities at risk for the same fate as New Orleans -- since sea level from climate change will ultimately put many cities, like Miami, below sea level? And just how do you adapt to sea levels rising 6 to 12 inches a decade for centuries, which well may be our fate by 2100 if we don't reverse greenhouse-gas emissions trends soon. Climate change driven by human-caused GHGs is already happening much faster than past climate change from natural causes -- and it is accelerating.

#### Not too late – every reduction key

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[Dana, is an environmental scientist at a private environmental consulting firm in the Sacramento, California area. He has a Bachelor's Degree in astrophysics from the University of California at Berkeley, and a Master's Degree in physics from the University of California at Davis. He has been researching climate science, economics, and solutions as a hobby since 2006, and has contributed to Skeptical Science since September, 2010, <http://www.skepticalscience.com/realistically-what-might-future-climate-look-like.html>, HM]

We're not yet committed to surpassing 2°C global warming, but as Watson noted, we are quickly running out of time to realistically give ourselves a chance to stay below that 'danger limit'. However, 2°C is not a do-or-die threshold. Every bit of CO2 emissions we can reduce means that much avoided future warming, which means that much avoided climate change impacts. As Lonnie Thompson noted, the more global warming we manage to mitigate, the less adaption and suffering we will be forced to cope with in the future. Realistically, based on the current political climate (which we will explore in another post next week), limiting global warming to 2°C is probably the best we can do. However, there is a big difference between 2°C and 3°C, between 3°C and 4°C, and anything greater than 4°C can probably accurately be described as catastrophic, since various tipping points are expected to be triggered at this level. Right now, we are on track for the catastrophic consequences (widespread coral mortality, mass extinctions, hundreds of millions of people adversely impacted by droughts, floods, heat waves, etc.). But we're not stuck on that track just yet, and we need to move ourselves as far off of it as possible by reducing our greenhouse gas emissions as soon and as much as possible. There are of course many people who believe that the planet will not warm as much, or that the impacts of the associated climate change will be as bad as the body of scientific evidence suggests. That is certainly a possiblity, and we very much hope that their optimistic view is correct. However, what we have presented here is the best summary of scientific evidence available, and it paints a very bleak picture if we fail to rapidly reduce our greenhouse gas emissions. If we continue forward on our current path, catastrophe is not just a possible outcome, it is the most probable outcome. And an intelligent risk management approach would involve taking steps to prevent a catastrophic scenario if it were a mere possibility, let alone the most probable outcome. This is especially true since the most important component of the solution - carbon pricing - can be implemented at a relatively low cost, and a far lower cost than trying to adapt to the climate change consequences we have discussed here (Figure 4).

#### Even if adaptation was possible – non-linear impacts disrupt the process

Mazo 2010 [Jeffrey Mazo, Managing Editor, Survival and Research Fellow for Environmental Security and Science Policy at the International Institute for Strategic Studies in London, 3-2010, “Climate Conflict: How global warming threatens security and what to do about it,” pg. 29]

This latter aspect, the rate of change, is a critical factor in terms of adapting to climate change. Although some states and societies will be better able to adapt to change than others, regardless of how resilient a given society is there will always be some point at which its efforts would be overwhelmed by the pace of change. Changes in climate - long-term wind and rainfall patterns, daily and seasonal temperature variations, and so on - will produce physical effects such as droughts, floods and increasing severity of typhoons and hurricanes, and ecological effects such as changes in the geographical range of species (including disease-causing organisms, domesticated crops and crop pests). These physical changes in turn may lead to effects such as disruption of water resources, declining crop yields and food stocks, wildfires, severe disease outbreaks, and an increase in numbers of refugees and internally displaced persons.4

### AT: Natural Factors

#### Natural factors don’t explain warming

**EDF ’10** (Environmental Defense Fund, a leading environmental non-profit, “How Do We Know Humans are Responsible?

,” http://www.edf.org/page.cfm?tagid=54136, AM)

The theory of global warming is nothing new. The Nobel Prize-winning chemist Svante Arrhenius first proposed the idea of global warming in 1896. Carbon dioxide, he knew, traps heat in the Earth's atmosphere. He also knew that burning coal and oil releases carbon dioxide (CO2). Arrhenius speculated that continued burning of coal and oil would increase concentrations of CO2 in the Earth's atmosphere, making the planet warmer. It's called the "greenhouse effect." What warms the Earth? To determine what is causing today's rapid global warming, scientists have examined all the factors that can affect the Earth's temperature. There are essentially three factors that could be responsible for recent rapid global warming: The sun Earth's reflectivity Greenhouse gases Which of these is causing our current global warming? It's not the sun: cause of little warming since 1750, none since 1980s Ultimately, the climate system is powered by the sun: all else being equal, if you turn up the sun, you'll warm up the Earth. According to IPCC estimates**, the sun has accounted for just a small portion of warming since 1750**. A study of more recent solar activity has demonstrated that since about 1985 the sun has changed in ways that, if anything, **should have *cooled* the planet**—even as global temperatures have been rising. So the sun is not causing global warming. It's not reflectivity: changes point to cooling, not warming Around 30% of the sun's energy that reaches the Earth is reflected back into space. Changes in how much sunlight is absorbed, and how much is reflected, can affect global temperatures. Using satellite and land-based observations and computer models, scientists have calculated how Earth's reflectivity has changed over time. These calculations suggest that human-produced particulate pollution, especially reflective sulfur-containing particles, have had a cooling effect on the climate, masking some of the warming effect of greenhouse gases. In fact, the slight decrease in global temperature between 1945 and 1975 was likely caused by a combination of rising particulate pollution and natural factors. Warming resumed after 1975 when industrialized countries began to clean up their particulate pollution while continuing to increase their greenhouse gas emissions. As for human land use changes (primarily forest clearing for agriculture), they have on balance brightened the planet since 1750. This would have a cooling effect, yet we've seen warming. Changes in the frequency of volcanic eruptions, which can send reflective particles up into the stratosphere, also cannot explain the observed warming trend. So reflectivity is not causing global warming. All the evidence points to greenhouse gases **That leaves the greenhouse effect as the only remaining scientific explanation for the rise in global temperatures in recent decades**. We have direct measurements of CO2 concentrations in the atmosphere going back more than 50 years, and indirect measurements (from ice cores) going back hundreds of thousands of years. These measurements confirm that concentrations are rising rapidly. **Though natural amounts of CO2 have varied from 180 to 300 parts per million (ppm), today's CO2 levels are around 380 ppm. That's 25% more than the highest natural levels over the past 800,000 years.** **Increased CO2 levels have contributed to periods of higher average temperatures throughout that long record**. (Boden,Carbon Dioxide Information Analysis Center) We also know the additional CO2 in the atmosphere comes mainly from coal and oil, because the chemical composition of the CO2 contains a unique "fingerprint." As far as scientists are concerned, it's case closed: human activity is causing the Earth to get warmer, primarily through the burning of fossil fuels, with a smaller contribution from deforestation. **All other scientific explanations for why the Earth is getting warmer have been eliminated.**

### AT: Research Bias

#### A majority of the climate debate is entirely settled—we don’t need 100% certainly, just consensus. Media skepticism and denier research should be rejected. Climate scientists are non-biased, but the same cannot be said for their counter-parts.

**Lewandowsky and Ashley 6/24/11** (Stephan, Professor of Cognitive Studies at the University of Western Australia, and Michael, Professor of Astrophysics at the University of New South Wales, “The false, the confused and the mendacious: how the media gets it wrong on climate change

,” http://theconversation.edu.au/the-false-the-confused-and-the-mendacious-how-the-media-gets-it-wrong-on-climate-change-1558, AM)

Certainty in science If you ask a scientist whether something is “settled” beyond any doubt, they will almost always reply “no”. Nothing is 100% certain in science. So how certain is climate science? Is there a 50% chance that the experts are wrong and that the climate within our lifetimes will be just fine? Or is there a 10% chance that the experts are wrong? Or 1%, or only 0.0001%? The answer to these questions is vital because if the experts are right, then we must act to avert a major risk. Dropping your phone Suppose that you lose your grip on your phone. Experience tells us that the phone will fall to the ground. You drop a phone, it falls down. Fact. Science tells us that this is due to gravity, and no one doubts its inevitability. However, while science has a good understanding of gravity, our knowledge is only partial. In fact, physicists know that at a very deep level our theory of gravity is inconsistent with quantum mechanics, so one or both will have to be modified. We simply don’t know for sure how gravity works. But we still don’t jump off bridges, and you would be pretty silly to drop your phone onto a concrete floor in the hope that gravity is wrong. Climate change vs. gravity: Greater complexity, comparable certainty Our predictions of climate change aren’t as simple as the action of gravity on a dropped phone. The Earth is a very complex system: there are natural effects like volcanoes, and variations in the sun; there are the vagaries of the weather; there are complicating factors such as clouds, and how ice responds; and then there are the human influences such as deforestation and CO2 emissions. But despite these complexities, some aspects of climate science are thoroughly settled. We know that atmospheric CO2 is increasing due to humans. We know that this CO2, while being just a small fraction of the atmosphere, has an important influence on temperature. We can calculate the effect, and predict what is going to happen to the earth’s climate during our lifetimes, all based on fundamental physics that is as certain as gravity. The consensus opinion of the world’s climate scientists is that climate change is occurring due to human CO2 emissions. The changes are rapid and significant, and the implications for our civilisation may be dire. **The chance of these statements being wrong is vanishingly small.** Scepticism and denialism Some people will be understandably sceptical about that last statement. But when they read up on the science, and have their questions answered by climate scientists, they come around. These people are true sceptics, and a degree of scepticism is healthy. Other people will disagree with the scientific consensus on climate change, and will challenge the science on internet blogs and opinion pieces in the media, but no matter how many times they are shown to be wrong, they will never change their opinions. These people are deniers. The recent articles in The Conversation have put the deniers under the microscope. Some readers have asked us in the comments to address the scientific questions that the deniers bring up. This has been done. Not once. Not twice. Not ten times. Probably more like 100 or a 1000 times. Denier arguments have been dealt with by scientists, again and again and again. But like zombies, the deniers keep coming back with the same long-falsified and nonsensical arguments. The deniers have seemingly endless enthusiasm to post on blogs, write letters to editors, write opinion pieces for newspapers, and even publish books. **What they rarely do is write coherent scientific papers on their theories and submit them to scientific journals. The few published papers that have been sceptical about climate change have not withstood the test of time.** The phony debate on climate change So if the evidence is this strong, why is there resistance to action on climate change in Australia? At least two reasons can be cited. First, as The Conversation has revealed, there are a handful of individuals and organisations who, by avoiding peer review, have engineered a phony public debate about the science, when in fact that debate is absent from the one arena where our scientific knowledge is formed. These individuals and organisations have so far largely escaped accountability. But their free ride has come to an end, as the next few weeks on The Conversation will continue to show. The second reason, alas, involves systemic failures by the media. Systemic media failures arise from several presumptions about the way science works, which range from being utterly false to dangerously ill-informed to overtly malicious and mendacious. The false Let’s begin with what is merely false. A tacit presumption of many in the media and the public is that climate science is a brittle house of cards that can be brought down by a single new finding or the discovery of a single error. Nothing could be further from the truth. Climate science is a cumulative enterprise built upon hundreds of years of research. The heat-trapping properties of CO2 were discovered in the middle of the 19th century, pre-dating even Sherlock Holmes and Queen Victoria. The resulting robust knowledge will not be overturned by a single new finding. A further false presumption of the media is that scientific opinions must somehow be balanced by an opposing view. While balance is an appropriate conversational frame for the political sphere, it is wholly inappropriate for scientific issues, where what matters is the balance of evidence, not opinion. At first glance, one might be tempted to forgive the media’s inappropriate inclusion of unfounded contrarian opinions, given that its function is to stimulate broad debate in which, ideally, even exotic opinions are given a voice. But the media by and large do not report the opinions of 9/11 “truthers” who think that the attacks were an “inside job” of the Bush administration. The media also do not report the opinion of people who believe Prince Phillip runs the world’s drug trade. The fact that equally outlandish pseudo-scientific nonsense about climate science can be sprouted on TV by a cat palmist is evidence not of an obsession with balance but of a striking and selective failure of editorial responsibility. What is needed instead of the false symmetry implied by “balance” is what the BBC calls impartiality – fact-based reporting that evaluates the evidence and comes to a reality-based conclusion. The dangerously ill-formed An example of a dangerously ill-informed opinion on how science works is the widely propagated myth that scientists somehow have a “vested interest”, presumably financial, in climate change. **This myth has been carefully crafted by deniers to create a chimerical symmetry between their own ties to political and economic interests and the alleged “vested interests” of scientists.** In actual fact, climate scientists have as much vested interest in the existence of climate change as cancer researchers do in the existence of the human papilloma virus (HPV). Cancer researchers are motivated by the fact that cervical cancer kills, and the scientists who developed the HPV vaccine did so to save lives, not to get their grants renewed. Climate scientists are likewise motivated by the fact that climate change kills 140,000 people per year right at this very moment, according to the World Health Organization. The scientists who have been alerting the public of this risk for nearly 20 years did so to save lives, not to get their grants renewed. Climate scientists are being motivated by the realisation that humanity has got itself into serious trouble with climate change, and it will need the best scientific advice to navigate a solution. As scientists, we ask not for special consideration by the media, but simply for the same editorial responsibility and quality control that is routinely applied to all other arenas of public discourse. Selective failure of quality control and editorial responsibility when it comes to climate change presents a grave public disservice. The malicious Finally, no truthful analysis of the Australian media landscape can avoid highlighting the maliciousness of some media organisations, primarily those owned by Newscorp, which are cartoonish in their brazen serial distortion of scientists and scientific findings. Those organisations have largely escaped accountability to date, and we believe that it is a matter of urgency to expose their practice. For example, it is not a matter of legitimate editorial process to misrepresent what experts are telling Newscorp reporters — some of whom have been known to apologize to scientists in advance and off the record for their being tasked to return from public meetings, not with an actual news story but with scathing statements from the handful of deniers in the audience. It is not a matter of legitimate editorial process to invert the content of scientific papers. It is not a matter of legitimate editorial process to misrepresent what scientists say. It is not a matter of legitimate editorial process to prevent actual scientists from setting the record straight after the science has been misrepresented. None of those sadly common actions are compatible with legitimate journalistic ethics, and they should have no place in a knowledge economy of the 21st century. The very fact that society is wracked by a phony debate where there is none in the scientific literature provides strong evidence that the Australian media has tragically and thoroughly failed the Australian public.

### AT SO2 Turn

#### SO2 causes warming- multiple feedback loops- all other studies fail because they don’t assume other particles

**Science Daily, 10** (Best Hope for Saving Arctic Sea Ice Is Cutting Soot Emissions, Say Researchers, J*uly 30, 2010,* <http://www.sciencedaily.com/releases/2010/07/100728092617.htm>)

The quickest, best way to slow the rapid melting of Arctic sea ice is to reduce soot emissions from the burning of fossil fuel, wood and dung, according to a new study by Stanford researcher Mark Z. Jacobson. His analysis shows that soot is second only to carbon dioxide in contributing to global warming. But, he said, climate models to date have mischaracterized the effects of soot in the atmosphere. Because of that, soot's contribution to global warming has been ignored in national and international global warming policy legislation, he said. "Controlling soot may be the only method of significantly slowing Arctic warming within the next two decades," said Jacobson, director of Stanford's Atmosphere/Energy Program. "We have to start taking its effects into account in planning our mitigation efforts and the sooner we start making changes, the better." To reach his conclusions, Jacobson used an intricate computer model of global climate, air pollution and weather that he developed over the last 20 years that included atmospheric processes not incorporated in previous models. He examined the effects of soot -- black and brown particles that absorb solar radiation -- from two types of sources. He analyzed the impacts of soot from fossil fuels -- diesel, coal, gasoline, jet fuel -- and from solid biofuels, such as wood, manure, dung, and other solid biomass used for home heating and cooking in many locations. He also focused in detail on the effects of soot on heating clouds, snow and ice. What he found was that the **combination** of **both** types of soot is the second-leading cause of global warming after carbon dioxide. That ranks the effects of soot ahead of methane, an important greenhouse gas. He also found that soot emissions kill more than 1.5 million people prematurely worldwide each year, and afflicts millions more with respiratory illness, cardiovascular disease and asthma, mostly in the developing world where biofuels are used for home heating and cooking. Jacobson's study will be published in *Journal of Geophysical Research (Atmospheres)*. **Reducing soot could have immediate impact** It is the magnitude of soot's contribution, combined with the fact that it lingers in the atmosphere for only a few weeks before being washed out, that leads to the conclusion that a reduction in soot output would start slowing the pace of global warming almost **immediately**. Greenhouse gases, in contrast, typically persist in the atmosphere for decades -- some up to a century or more -- creating a considerable time lag between when emissions are cut and when the results become apparent. Mark Jacobson found that eliminating soot produced by the burning of fossil fuel and solid biofuel could reduce warming above parts of the Arctic Circle in the next 15 years by up to 1.7 degrees Celsius. Jacobson found that eliminating soot produced by the burning of fossil fuel and solid biofuel could reduce warming above parts of the Arctic Circle in the next 15 years by up to 1.7 degrees Celsius. For perspective, net warming in the Arctic has been at least 2.5 degrees Celsius during the last century and is expected to warm significantly more in the future if nothing is done. The most immediate, effective and low-cost way to reduce soot emissions is to put particle traps on vehicles, diesel trucks, buses, and construction equipment. Particle traps filter out soot particles from exhaust fumes. Soot could be further reduced by converting vehicles to run on clean, renewable electric power. Jacobson found that although fossil fuel soot contributed more to global warming, biofuel-derived soot caused about eight times the number of deaths as fossil fuel soot. Providing electricity to rural developing areas, thereby reducing usage of solid biofuels for home heating and cooking, would have major health benefits, he said. Soot from fossil fuels contains more **black** **carbon** than soot produced by burning biofuels, which is why there is a difference in impact. Black carbon is highly efficient at absorbing solar radiation in the atmosphere, just like a black shirt on a sunny day. Black carbon converts sunlight to heat and radiates it back to the air around it. This is different from greenhouse gases, which primarily trap heat that rises from the Earth's surface. Black carbon can also absorb light reflecting from the surface, which helps make it such a potent warming agent. **First model of its type** Jacobson's climate model is the first global model to use mathematical equations to describe the physical and chemical interactions of soot particles in cloud droplets in the atmosphere. This allowed him to include details such as light bouncing around inside clouds and within cloud drops, which he said are critical for understanding the full effect of black carbon on heating the atmosphere. "The key to modeling the climate effects of soot is to account for all of its effects on clouds, sea ice, snow and atmospheric heating," Jacobson said. Because of the complexity of the processes, he said it is not a surprise that **previous** **models** have not correctly treated the physical interactions required to simulate cloud, snow, and atmospheric heating by soot. "But **without treating these processes, no model can give the correct answer with respect to soot's effects**," he said. Jacobson argues that leaving out this scale of detail in other models has led many scientists and policy makers to undervalue the role of black carbon as a warming agent. The strong global heating due to soot that Jacobson found is supported by recent findings of Veerabhadran Ramanathan, a professor of climate and atmospheric science at the Scripps Institute of Oceanography, who measures and models the climate effects of soot. "Jacobson's study is the first time that a model has looked at the various ways black carbon can impact climate in a quantitative way," said Ramanathan, who was not involved in the study. Black carbon has an especially potent warming effect over the Arctic. When black carbon is present in the air over snow or ice, sunlight can hit the black carbon on its way towards Earth, and also hit it as light reflects off the ice and heads back towards space. "It's a double-whammy over the ice surface in terms of heating the air," Jacobson said. Black carbon also lands on the snow, darkening the surface and enhancing melting. "There is a big concern that if the Arctic melts, it will be a **tipping** **point** for the Earth's climate because the reflective sea ice will be replaced by a much darker, heat absorbing, ocean below," said Jacobson. "Once the sea ice is gone, it is really hard to regenerate because there is not an efficient mechanism to cool the ocean down in the short term." Jacobson's work was supported by grants from the U.S. Environmental Protection Agency, NASA, the NASA high-end computing program and the National Science Foundation.

#### Most recent studies prove SO2 is a major cause of warming.

**MSNBC,** “Primary Cause of Global Warming Discovered, According to Dr. Peter L. Ward of Teton Tectonics,” 2/8/**2009**, http://www.msnbc.msn.com/id/29086842/

Sulfur dioxide emitted from volcanoes and from burning fossil fuel is the primary initiator of global climate change, according to Dr. Peter L. Ward, a retired U.S. Geological Survey scientist who continues to study the earth and its environment through his own company, Teton Tectonics. "Carbon dioxide is a greenhouse gas compounding global warming, but it is not the initiator of climate change," according to Ward. In a paper to be published this week, Ward concludes that sulfur dioxide emissions regulate the ability of the atmosphere to clean itself by oxidizing greenhouse gases. Sulfur dioxide reacts quickly with available oxidants, leaving few to react with other greenhouse gases. The primary oxidants, created by the effects of ultraviolet sunlight on ozone, are, like ozone, in limited supply. Ward observed that the highest rates of global warming in the past 46,000 years occurred precisely when volcanoes were most active. "When very large volcanic eruptions occur every few months," Ward says, "rapid warming follows. Too much sulfur dioxide in a short period of time causes warming." Large eruptions in the past 2000 years occurred once per century. Yet by 1962, human activities were putting as much sulfur dioxide into the atmosphere every 1.7 years as one of these large eruptions. That was enough to cause world temperatures to climb rapidly. Beginning in 1979, global efforts to reduce acid rain cut power-plant sulfur emissions 18% by 2000. By 2000, global temperature stopped increasing, a fact unexplained by current climate theories. "By reducing acid rain, we accidentally reduced global warming," Ward said. "The problem now is that sulfur dioxide emissions are rapidly increasing again as new power plants come on line every week around the world. But we know how to reduce sulfur emissions both technically and politically. It is much easier to do than reducing carbon dioxide emissions."

#### SO2 leads to increased warming—only short term reduces effects

Tim **Wall** July 7, **2011** Discovery News Sulfur Smoke slowed global warming slightly http://news.discovery.com/earth/sulfur-smoke-slowed-global-warming-slightly-110707.html

In the rush to industrialize, China used coal plants without filters. Unfiltered coal smoke contains sulfur. And that air-borne sulfur blocked the sun's rays from ever reaching the Earth's surface. But before you start burning brimstone to save the polar bears, think about this. Sulfur containing chemicals also cause acid rain and contribute to toxic smogs. That's why Chinese, and most other nations' power plants now install scrubbers to remove the sulfur from the smoke. Sulfur's effect is short-lived. It drops out of the atmosphere after a few months to years, whereas carbon dioxide can stay [in the atmosphere for centuries](http://www.newton.dep.anl.gov/askasci/wea00/wea00296.htm). That means the carbon dioxide keeps insulating the Earth long after the sulfur is no longer blocking the sunlight. This isn't the first time industrial booms have masked the greenhouse effect. After World War II, industrial production soared, and sulfur slowed global warming, Kaufmann said. Some have even suggested pumping sulfur into the atmosphere to act as a band-aid to climate change. But other research by Simone Tilmes of the National Center for Atmospheric Research has suggested that sulfur compounds would react with ozone high in the atmosphere and slow the healing of the hole in the ozone layer above Antarctica.

#### Acid rain increasing—direct result of SO2

**China Daily** January 12, **2011** A hard rain is falling as acid erodes beauty http://www.chinadaily.com.cn/usa/2011-01/12/content\_11833224.htm

Official statistics show every drop of rain in Xiamen in the first half of 2010 was acidic, recording pH levels of less than 5.6 (neutral is 7). "The **acid rain** is leaving buildings with yellowish signs of corrosion ... and is slowly turning the leafy island yellow," said Zhuang Mazhan, chief engineer at Xiamen's Environmental Monitoring Central Station. "It's making the city much less attractive." Xiamen is not the only victim. Leshan Giant Buddha, which has stood in Southwest China for more than 1,000 years, has also been badly affected. Its nose is turning black, hair curls have fallen from its head and its reddish body is becoming a charred gray color. At 71 meters high and 28 meters wide, the Buddhist statue in Sichuan province is the largest of its kind in the world. Since being carved out of a cliff during the Tang Dynasty (AD 618-907), the relic has survived floods and earthquakes, but it is now at great risk from a man-made threat. **Acid** **rain** is a by-product of burning coal and fossil fuels. Combustion releases **sulfur** dioxide (SO2) and nitrogen oxides (both nitric oxide and nitrogen dioxide) into the air, which bond with water and oxygen molecules and then fall as sulfuric and nitric acid. As the world's largest coal consumer, China is also the third largest **acid rain** region, after Europe and North America. A 2005 report found that 28 percent of the country's territory, mostly south of the Yangtze River, was affected by **acid rain**. In 2005, Chinese factories spewed out 25.5 million tons of SO2, double the level regarded as "safe", according to the country's environmental authorities. The findings prompted the central government to adopt an aggressive target to rein in the rapid increase of SO2 emissions from unbridled industrial development. The aim was to reduce the discharge of the pollutant by 10 percent by the end of 2010. Through phasing out inefficient thermal power-generating units and installing scrubbers (chemical filters fitted in chimneys) to remove pollutants, China achieved a 14-percent drop in SO2 emission between 2006 and 2010, from 2005 levels, said Zhou Shengxian, minister of environmental protection. However, as China claimed victory in meeting its 10-percent **sulfur** reduction target, monitoring results showed **acid rain** is still battering many parts of the country, with increased frequency in some areas. According to the latest annual quality report published by the Ministry of Environmental Protection, 258 cities and counties recorded acid rainfall in 2009. For 112 of them, at least one in every two precipitations was acidic. In fact, the areas suffering from **acid rain** are actually expanding, with some already reporting increased acidity, an internal study commissioned by the ministry and led by Tsinghua University has discovered. Monitoring stations in the Pan-Bohai Bay area in Northeast China, for example, have recorded the highest frequency and acidity of **acid rain** in 15 years, states the study report. The coastal city of Dalian in Liaoning province, also a popular summer resort, reported an **acid rain** frequency of 51.6 percent in 2007. Acid rainfall is also increasing along the west coast of the Taiwan Straits, around Chengdu and Chongqing in Southwest China and throughout the Pan-Beibu Gulf Economic Zone in the south. All these regions are expected to become the country's next growth engines thanks to booming heavy industries, such as petrochemicals, energy, metallurgy and equipment manufacturing, according to the Tsinghua-led study. Cutting emissions The sad findings of that report suggest the country has failed to curb environmental deterioration despite huge anti-pollution efforts, said Wei Fusheng, an academician at the Chinese Academy of Engineering.

#### Acid rain destroys plant life—Seeps into soil and destroys roots

**Daily Trust** March 31, **2010** Mustapha Suleiman Staff writer http://allafrica.com/stories/201004020440.html

Effects of **acid rain** on plant life: **Acid** **rain** seeps into the earth and poisons plants and trees by dissolving toxic substances in the soil, such as aluminum, which get absorbed by the roots. **Acid** **rain** also dissolves the beneficial minerals and nutrients in the soil, which are then washed away before the plants and trees have a chance of using them in order to grow. When there is frequent **acid rain**, it corrodes the waxy protective coating of the leaves. When this protective coating on the leaves is lost, it results in making the plant susceptible to disease. When the leaves are damaged, the plant loses its ability to produce sufficient amounts of nutrition for it to stay healthy. Once weakened, the plant becomes vulnerable to the cold weather, insects, and disease, which can lead to its death.

#### Acid rain hurts aquatic life—sulfuric acid destroys fishes’ ability to take in nutrients

**Daily Trust** March 31, **2010** Mustapha Suleiman Staff writer http://allafrica.com/stories/201004020440.html

Effects of **acid rain** on aquatic life: Apart from plants, **acid rain** also affects aquatic organisms adversely. A high amount of sulfuric acid interferes with the ability of fish to take in nutrients, salt, and oxygen. As far as freshwater fish is concerned, in order for them to stay alive they need to have the ability of maintaining a balance between the minerals and salts in their tissues. The molecules of acid result in mucus forming in their gills, which prevents them from absorbing oxygen in adequate amounts. Plus, the acidity, which reduces the pH level, causes the imbalance of salt in the tissues of fish. Moreover, this change in the pH level also impairs the some of the fish's ability to maintain their calcium levels. This impairs reproduction the ability of the fish, because the eggs become to weak or brittle. Lack of calcium also causes deformed bones and weakened spines.

### Ocean Acidification Scenario

#### Current Carbon emissions guarantee ocean acidification – only reversing these trends ensures ocean resiliency – the alternative collapses marine life

Potsdam Institute, 2012 (Potsdam Institute for Climate Impact Research and Climate Analytics, “Turn Down the Heat: Why a 4°C Warmer World Must be Avoided”, A report for the World Bank, November, http://climatechange.worldbank.org/sites/default/files/Turn\_Down\_the\_heat\_Why\_a\_4\_degree\_centrigrade\_warmer\_world\_must\_be\_avoided.pdf)

The high emission scenarios would also result in very high carbon dioxide concentrations and ocean acidification, as can be seen in Figure 25 and Figure 26. The increase of carbon dioxide concentration to the present-day value of 390 ppm has caused the pH to drop by 0.1 since preindustrial conditions. This has increased ocean acidity, which because of the logarithmic scale of pH is equivalent to a 30 percent increase in ocean acidity (concentration of hydrogen ions). The scenarios of 4°C warming or more by 2100 correspond to a carbon dioxide concentration of above 800 ppm and lead to a further decrease of pH by another 0.3, equivalent to a 150 percent acidity increase since preindustrial levels. Ongoing ocean acidification is likely to have very severe consequences for coral reefs, various species of marine calcifying organisms, and ocean ecosystems generally (for example, Vézina & Hoegh-Guldberg 2008; Hofmann and Schellnhuber 2009). A recent review shows that the degree and timescale of ocean acidification resulting from anthropogenic CO2 emissions appears to be greater than during any of the ocean acidification events identified so far over the geological past, dating back millions of years and including several mass extinction events (Zeebe 2012). If atmospheric CO2 reaches 450 ppm, coral reef growth around the world is expected to slow down considerably and at 550 ppm reefs are expected to start to dissolve (Cao and Caldeira 2008; Silverman et al. 2009). Reduced growth, coral skeleton weakening, and increased temperature dependence would start to affect coral reefs already below 450 ppm. Thus, a CO2 level of below 350 ppm appears to be required for the long-term survival of coral reefs, if multiple stressors, such as high ocean surface-water temperature events, sea-level rise, and deterioration in water quality, are included (Veron et al. 2009). Based on an estimate of the relationship between atmospheric carbon dioxide concentration and surface ocean acidity (Bernie, Lowe, Tyrrell, and Legge 2010), only very low emission scenarios are able to halt and ultimately reverse ocean acidification (Figure 26). An important caveat on these results is that the approach used here is likely to be valid only for relatively short timescales. If mitigation measures are not implemented soon to reduce carbon dioxide emissions, then ocean acidification can be expected to extend into the deep ocean. The calculations shown refer only to the response of the ocean surface layers, and once ocean acidification has spread more thoroughly, slowing and reversing this will be much more difficult. This would further add significant stress to marine ecosystems already under pressure from human influences, such as overfishing and pollution.

**Acidification causes extinction**

Kristof 6 (NICHOLAS D. KRISTOF, American journalist, author, op-ed columnist, and a winner of two Pulitzer Prizes, “Scandal Below the Surface”, Oct 31, 2006, http://select.nytimes.com/2006/10/31/opinion/31kristof.html?\_r=1, CMR)

If you think of the earth’s surface as a great beaker, then it’s filled mostly with ocean water. It is slightly alkaline, and that’s what creates a hospitable home for fish, coral reefs and plankton — and indirectly, higher up the food chain, for us. But scientists have discovered that the carbon dioxide (CO2) we’re spewing into the air doesn’t just heat up the atmosphere and lead to rising seas. Much of that carbon is absorbed by the oceans, and there it produces carbonic acid — the same stuff found in soda pop. That makes oceans a bit more acidic, impairing the ability of certain shellfish to produce shells, which, like coral reefs, are made of calcium carbonate. A recent article in Scientific American explained the indignity of being a dissolving mollusk in an acidic ocean: “Drop a piece of chalk (calcium carbonate) into a glass of vinegar (a mild acid) if you need a demonstration of the general worry: the chalk will begin dissolving immediately.” The more acidic waters may spell the end, at least in higher latitudes, of some of the tiniest variations of shellfish — certain plankton and tiny snails called pteropods. This would **disrupt the food chain,** possibly killing off many whales and fish, and rippling up all the way to humans. We stand, so to speak, on the shoulders of plankton. “There have been a couple of very big events in geological history where the carbon cycle changed dramatically,” said Scott Doney, senior scientist at the Woods Hole Oceanographic Institution in Massachusetts. One was an abrupt warming that took place 55 million years ago in conjunction with acidification of the oceans and **mass extinctions**. Most scientists don’t believe we’re headed toward a man-made variant on that episode — not **yet**, at any rate. But many worry that we’re hurtling into unknown dangers. “Whether in 20 years or 100 years, I think marine ecosystems are going to be dramatically different by the end of this century, and that’ll lead to **extinction events**,” Mr. Doney added. “This is the only habitable planet we have,” he said. “The damage we do is going to be felt by **all the generations to come.”** So that should be one of the great political issues for this century — the vandalism we’re committing to our planet because of our refusal to curb greenhouse gases. Yet the subject is barely debated in this campaign. Changes in ocean chemistry are only one among many damaging consequences of carbon emissions. Evidence is also growing about the more familiar dangers: melting glaciers, changing rainfall patterns, rising seas and more powerful hurricanes. Last year, the World Health Organization released a study indicating that climate change results in an extra 150,000 deaths and five million sicknesses each year, by causing the spread of malaria, diarrhea, malnutrition and other ailments. A report prepared for the British government and published yesterday, the Stern Review on the Economics of Climate Change, warned that inaction “could create risks of major disruption to economic and social activity, on a scale similar to those associated with the great wars and the economic depression of the first half of the 20th century.” If emissions are not curbed, climate change will cut 5 percent to 20 percent of global G.D.P. each year, declared the mammoth report. “In contrast,” it said, “the costs of action — reducing greenhouse gas emissions to avoid the worst impacts of climate change — can be limited to around 1 percent of global G.D.P. each year.” Some analysts put the costs of action higher, but most agree that it makes sense to invest far more in alternative energy sources, both to wean ourselves of oil and to reduce the strain on our planet. We know what is needed: a carbon tax or cap-and-trade system, a post-Kyoto accord on emissions cutbacks, and major research on alternative energy sources. But as The Times’s Andrew Revkin noted yesterday, spending on energy research and development has fallen by more than half, after inflation, since 1979.

#### And, it independently kills plankton

Cheng**,** Ph.D, associated professor at the University of Texas,2007(Victoria. July. Keystone Species Extinction Overview. http://www.arlingtoninstitute.org/wbp/species-extinction/443)

Plankton is a blanket term for many species of microorganisms that drift in open water and make up the base of the aquatic food chain. There are two types of plankton, phytoplankton and zooplankton. Phytoplankton make their own food through the process of photosynthesis, while zooplankton feed on phytoplankton. Zooplankton are in turn eaten by larger animals. In this way these tiny organisms sustain all life in the oceans. According to the NASA, phytoplankton populations in the northern oceans have declined by as much as 30% since 1980.[4] While the cause of this decline remains uncertain, there are several theories.One theory points to global warming as the main cause.[5] Phytoplankton require nutrients obtained from the bottom of the ocean to reproduce. At the Earth’s poles, ocean water is colder at the surface than down in the depths. Therefore water from the bottom of the ocean rises to the top, carrying with it essential nutrients from the ocean floor. However, as the water near the surface becomes warmer due to climate change, less water rises from the bottom, resulting in less nutrients for the phytoplankton. This consequently hinders their reproduction processes.Another theory suggests that carbon dioxide emissions are causing this decline in plankton population. The ocean has always absorbed a significant amount of carbon dioxide, but in recent years its capacity for this pollutant may not have been able to keep up with the level of human output. Recent studies suggest that the carbon dioxide the ocean absorbs is turned into carbonic acid, which lowers the pH level of the ocean.[6] This acidification is highly corrosive to sea animals that form shells, including pteropods, which are a type of zooplankton. Pteropods are a food source for countless larger animals such as salmon and cod. If they are unable to survive in an acidic ocean, then the entire ocean system will be threatened.

### Food Chain Impact

#### Extinction – oxygen depletion and food chains

UPI **June 6,** 2008 (http://www.upi.com/Energy\_Resources/2008/06/06/Acidic\_oceans\_may\_tangle\_food\_chain/UPI-84651212763771/print/)

Increased carbon levels in ocean water could have devastating impacts on marine life, scientists testified Thursday at a congressional hearing. Although most of the concern about carbon emissions has focused on the atmosphere and resulting temperature changes, accumulation of carbon dioxide in the ocean also could have disturbing outcomes, experts said at the hearing, which examined legislation that would create a program to study how the ocean responds to increased carbon levels. Ocean surface waters quickly absorb carbon dioxide from the atmosphere, so as carbon concentrations rise in the skies, they also skyrocket in the watery depths that cover almost 70 percent of the planet. As carbon dioxide increases in oceans, the acidity of the water also rises, and this change could affect a wide variety of organisms, said Scott Doney, senior scientist at the Woods Hole Oceanographic Institution, a non-profit research institute based in Woods Hole, Mass. "Greater acidity slows the growth or even dissolves ocean plant and animal shells built from calcium carbonate," Doney told representatives in the House Committee on Energy and the Environment. "Acidification thus threatens a wide range of marine organisms, from microscopic plankton and shellfish to massive coral reefs." If small organisms, like phytoplankton, are knocked out by acidity, the ripples would be far-reaching, said David Adamec, head of ocean sciences at the National Aeronautics and Space Administration. "If the amount of phytoplankton is reduced, you reduce the amount of photosynthesis going on in the ocean," Adamec told United Press International. "Those little guys are responsible for half of the oxygen you're breathing right now." A hit to microscopic organisms can also bring down a whole food chain. For instance, several years ago, an El Nino event wiped out the phytoplankton near the Galapagos Islands. That year, juvenile bird and seal populations almost disappeared. If ocean acidity stunted phytoplankton populations like the El Nino did that year, a similar result would occur -- but it would last for much longer than one year, potentially leading to extinction for some species, Adamec said. While it's clear increased acidity makes it difficult for phytoplankton to thrive, scientists don't know what level of acidity will result in catastrophic damages, said Wayne Esaias, a NASA oceanographer. "There's no hard and fast number we can use," he told UPI. In fact, although scientists can guess at the impacts of acidity, no one's sure what will happen in reality. Rep. Roscoe Bartlett, R-Md., pointed to this uncertainty at Thursday's hearing. "The ocean will be very different with increased levels of carbon dioxide, but I don't know if it will be better or worse," Bartlett said. However, even though it's not clear what the changes will be, the risk of doing nothing could be disastrous for ecosystems, said Ken Caldeira, a scientist at the Carnegie Institution for Science, a non-profit research organization. "The systems that are adapted to very precise chemical or climatological conditions will disappear and be replaced by species which, on land, we call weeds," Caldeira said. "What is the level of irreversible environmental risk that you're willing to take?" It's precisely this uncertainty that the Federal Ocean Acidification Research and Monitoring Act attempts to address. The bill creates a federal committee within the National Oceanic and Atmospheric Administration to monitor carbon dioxide levels in ocean waters and research the impacts of acidification. like Bishop. "We would lose everything," he told UPI.

### Sugar Ethanol Solves Warming

**Sugar ethanol could replace the volatile oil industry – the evidence to the contrary is oil industry propaganda**  
Yeomans 8

[Allan-agricultural consultant both in Australia and the US and post graduate work on nuclear physics and early computer designs at Dept of Physics, University of Sydney, “Global Warming/Climate Change,” 11-5-08, <http://en.allexperts.com/q/Global-warming-Climate-3851/2008/11/Disadvantages-Sugarcane-1.htm>]

QUESTION: Are there ANY potential disadvantages from sugar cane ethanol? Whether it be from the actual product or externalities, such as on the economy, jobs, etc? Any where I can learn more about disadvantages?¶ ANSWER: There are no disadvantages. We have to stop global warming and it utterly impossible without putting the oil companies out of business. We can produce all the biofuels that is ethanol and biodiesel we need to end the age of petroleum. With grain ethanol we harvest the highly nutritious plant seed. With sugarcane we harvest the sap. In any plant there is always more sap than seed. ¶ Sugarcane grows best in wet tropical locations. Sugarcane ethanol could supply the world and we would never need another drop of gasoline. If you are in the oil industry, or you don’t care if the world’s weather becomes so chaotic and dangerous as to cease killing thousands of humans and moves into on into the phase of killing millions of people a year then it’s possible to invent disadvantages to sugarcane ethanol. ¶ If you want to hear what are the advertised and proclaimed disadvantages of ethanol, ring any oil company’s public relations advisers. They have dreamed up hundreds to confuse you and create doubt in your mind. ¶ I can’t think of one single disadvantage compared to the horrific problems we produce by burning oil in our cars.¶ With sugarcane ethanol there would be thousands of jobs created that wouldn’t otherwise exist.

#### Sugarcane ethanol good- absorbs more CO2 than emits

**MARTINELLI and FILOSO 2008** (MARTINELLI, LUIZ: professor of ecology and geochemistry at the University of São Paulo in Brazil. the Ecological Society of America: "EXPANSION OF SUGARCANE ETHANOL PRODUCTION IN BRAZIL: ENVIRONMENTAL AND SOCIAL CHALLENGES." Texas A&M University <http://www.tamu.edu/faculty/tpd8/BICH407/Brazilenvsoc2.pdf>.)

In recent years, energy consumption and global carbon intensity (the ratio between carbon emissions and energy supplied) have increased worldwide, reinvigorating worries about potential depletion of fossil fuel reserves. Such increase, accompanied by growing political instability in oil-producing regions, has instigated many countries to search for alternative forms of energy. However, concerns about rising atmospheric CO2 concentration in the atmosphere due to fossil fuel burning and other anthropogenic activities, aggravated by compelling evidence of consequent dangerous changes in the climatic system of the Earth (IPCC 2007), have imposed some limits to the types of alternative energy that can be used, and conditions on how this energy is obtained. The most important limits and conditions are that the new forms of energy be renewable, environmentally friendly, and not contribute to the increase in atmospheric CO2 concentration in the atmosphere **Biofuel is a promising source of energy** because it is generated by the process of photosynthesis, where energy from the sun is captured and transformed into biomass that can be combusted to produce energy. In most cases, **this alternative source is renewable, since the CO2 emitted into the atmosphere is recaptured by the growing crop in the next growth cycle. Ethanol from sugarcane is one of the most promising biofuels because its energetic balance is generally positive, meaning that the growing** sugarcane absorbs more carbon than is emitted when the ethanol is burned as fuel (Oliveira et al. 2005). **Moreover, the price of production is relatively low.** Brazil has several advantages in this new scenario of biofuel production due to its expansive territory, geographical position, abundant water resources, and solar radiation. Moreover, for .30 years, the country has invested in improving the production of ethanol from sugarcane, reaching an estimated 19 billion liters of ethanol in 2007. This production is similar to that of corn ethanol in the USA. Despite such advantages, the environmental sustainability and economic fairness of ethanol production in Brazil are issues that still need to be carefully debated in the scientiﬁc, political, and civic communities before **sugarcane ethanol can be considered a ‘‘clean’’ fuel.** For one thing, unrestrained use of natural resources and consequent excessive environmental degradation related to the expansion of sugarcane in Brazil may jeopardize important services provided by natural ecosystems, which are already experiencing a large degree of degradation worldwide (Millennium Ecosystem Assessment 2005); curbing such environmental degradation (e.g., deforestation) will also help to prevent further accumulation of CO2 in the atmosphere. In addition, the exploitation of cane workers for the beneﬁt of the ethanol industry, without any signiﬁcant return to Brazilian society in terms of investments in education, health, and infrastructure, is also an issue. The main objectives of this study are (1) to discuss environmental and social issues linked to the expansion of sugarcane in Brazil for ethanol production, and (2) to provide recommendations to help policy makers and the Brazilian government establish new initiatives to produce a code for ethanol production that is environmentally sustainable and economically fair.

#### Sugar cane production is a closed carbon loop

**NSW 2004** (New South Wales Government: "Bioenergy." The Department has strong relationships with energy industry participants and the community. <http://www.energy.nsw.gov.au/sustainable/renewable/bioenergy>.)

In Australia, our current systems for handling the wastes we produce are not sustainable. Landfills are no longer seen as an acceptable way to dispose of urban wastes, and dumping fees are rising accordingly. In rural areas, wastes from agriculture can be an environmental burden in addition to the financial cost for disposal. Three compelling arguments for investigating bioenergy opportunities are: **every unit of energy sourced from biomass replaces one that would otherwise be derived from coal-fired power** (producing harmful greenhouse gas emissions); capturing waste methane prevents it from escaping to the atmosphere where it adds to the heat-trapping gases and the Greenhouse Effect; the market in Australia is reaching the point where bioenergy can mean opportunities for extra income from a waste, particularly in rural areas. **All managed sources of bioenergy will result in a net reduction in carbon dioxide emissions,** if they replace coal-fired generation. **In the case of plantation** timbers or **crops (like sugar cane)**, **the cycle of growing, harvesting and energy production does not produce or absorb any additional carbon.** **Carbon stored in the crop is released at harvest, then reabsorbed by the next crop, similar to the natural carbon cycle** (see diagram below). The **closed 'carbon loop' for bioenergy** In farming, **successful bioenergy projects go hand-in-hand with sustainable agriculture.** The ecological viability of a project can involve issues such as appropriate cropping cycles, the distance that fuel is transported, returning nutrients to the soil in the form of ash, or, in some areas, salinity management. **The sugar industry** in NSW **is a great example of innovation in agriculture, driven by the opportunity to generate bioenergy and sell it into the renewable energy market. The sugar industry has changed its harvesting and processing practices, so that much more of the available biomass is collected.** Canefield biomass in foreground ready for collecting and converting into bioenergy **Instead of burning off their cane fields before harvest, sugar farmers now collect all of the cane 'trash' as well as the sugar cane**, and transport it to the sugar mill, where it can be turned into energy. Two NSW sugar mills have installed large power generation plants, efficiently converting all of the bagasse and cane trash into energy.

#### Sugarcane is the best for carbon sequestration\*\*

**Parr and Sullivan 2007** (Dr. Jeff Parr and Professor Leigh Sullivan: researchers from Southern Cross University. Canegrowers: “Carbon Trading” <<http://epubs.scu.edu.au/cgi/viewcontent.cgi?article=1783&context=esm_pubs>> Canegrowers.com)

**Dr Jeff Parr and Professor Leigh Sullivan**, both researchers from Southern Cross University and Plantstone Pty Ltd in Lismore NSW, **have recently discovered that a process that occurs naturally in plants** (**especially** grasses such as **sugarcane), plays an important role in countering CO2 emissions and global warming**. This process is termed plantstone carbon and is also referred to as phytolith occluded carbon. **Their research shows that plantstone carbon has been extracting 300 million tonnes of CO2 per year from the atmosphere and storing it securely in soil for thousands of years**. What are plantstones? **Plantstones form as microscopic grains of silica in plant leaves, particularly** grass-based pastures and crops such as **sugarcane** and wheat. During plant growth a small proportion of organic carbon becomes encapsulated within the microscopic silica grains. **Regardless of whether the plant dies, burns or is harvested, the carbon entrapped in the plantstone is highly resistant to decomposition.** Therefore, unlike most plant matter, which readily decomposes and returns CO2 to the atmosphere**, the carbon in plantstone effectively removes CO2 from the atmosphere. This process essentially suggests that crop choice decisions by farmers could be a major contributing factor in the reduction of CO2 from the atmosphere.** Parr and Sullivan’s research in crop plantstone yields has shown that different plant types produce greatly varying amounts of plantstone carbon. According to the research team, some crops have been identified as producing over 1,000 times more plantstone carbon than other crop types. Moreover, varieties within a single crop type, such as sugarcane, have been found to produce widely differing quantities of plantstone carbon. This indicates that a farmer’s decision of choice of crop type and/or cultivar has a considerable impact on the amount of CO2 extracted from the atmosphere and securely stored in their farm’s soil. Some of the latest plantstone **research shows that sugarcane is the clear champion crop at carbon sequestration. Sugarcane can sequestrate up to 0.66 tonnes of CO2 per ha per year** in plantstones while many other crops (especially legumes) sequestrate comparatively little or no CO2 by this process. **Thus the benefits that farmers growing sugarcane provide to society is not just limited to the more obvious benefits such as the sugar they produce, but also to the environmental services that they provide by locking up enhanced amounts of carbon in the plantstones that are produced abundantly by their crop.** Increasing carbon sequestration by plantstones is by no means limited by a need to change the types of crops that a farmer grows. Indeed, it can be business-as-usual: by simply choosing to grow a high plantstone carbon yielding cultivar of a crop over a low plantstone carbon yielding cultivar of the same crop can greatly enhance carbon sequestration on the farm. For a sugarcane farmer, the relatively simple decision to choose to grow one sugarcane variety instead of another can result in an extra 0.25 tonnes of CO2 per ha per year being securely sequestered in the soil inside plantstones. Importantly, the research to date shows that there are no crop yield penalties involved in choosing to grow high plantstone carbon yielding cultivars over low plantstone carbon yielding cultivars. For grain crops such as wheat and sorghum, (for which there are readily available data) some of the highest yielding cultivars are also those that produce the greatest amounts of plantstone carbon.

#### Sugarcane-based energy is not only efficient but also reduces global greenhouse gas emissions\*\*

**Herrera 2000** ( Marianela Cordovés Herrera: Director of Industrial Promotion in the Food and agriculture Organization of the United Nations. FAO: "CANE, SUGAR AND THE ENVIRONMENT."  <http://www.fao.org/docrep/005/x4988e/x4988e01.htm>.)

In our world today, and to an ever-increasing extent in the years to come, no product sold on the market can be developed without taking into considerations its impact on the environment. This statement is particularly valid for a food product such as sugar, given the rising interest and expansion of markets for natural and organic products obtained through procedures, both in the agricultural and industrial stages, in which the use of chemicals and damage to the local and global environment are avoided or reduced to a minimum. Amidst the tense, controversial discussions taking place at present within the so-called Millennium Round, its agricultural negotiations and the issue of whether to include environmental matters in these talks, **cane sugar producers have many advantages to offer and arguments to show the superiority of cane as a raw material for food and energy production**; as opposed to other raw materials for sugar or substitute sweetener production such as corn and sugar beets. The aim of this **paper is** to attempt to present **a brief summary of the potential of sugar cane as regards the environment** as well as to discuss the current status of environmental legislation in effect in countries in the Latin American and Caribbean Region. Cane Agriculture The various cane varieties cultivated for commercial purposes world-wide are species or hybrids of the Saccharum genus, which in turn belongs to the grass family. Its geographical origin remains a controversial subject, but in general it is acknowledged that it originated in the South Pacific region, Java and New Guinea, and subsequently spread out from there. **One of the outstanding features of sugar cane is**, among others, its extraordinary capacity for growth. **It is not unusual to find agricultural yields exceeding 100 tons per hectare annually on commercial acreages**. Its genetic potential is much greater. When varieties are selected and agrotechnical handling are carried on, with the objective of maximizing biomass production, it is possible to obtain yields as high as 300 t/ha and even exceeding this volume. Theoretical potential of up to 400 t/ha is estimated. **This high productivity rate is the result of a high photosynthetic efficiency, compared to other commercial crops, which permits an increased utilization of solar energy and, consequently, a** higher coefficient for fixing atmospheric carbon dioxide**.** Further, cane agriculture can be practised with a minimum consumption of chemical products and highly compatible with the environment and soil conservation. An issue of the utmost importance, from an ecological as well as economic standpoint, is the harvest of green cane; that is, without previous burning the foliage for harvest. **Harvesting** green **cane is a widespread practice that has been used for many years in Cuba**, and which has been gradually extended to other countries such as Australia and Brazil. The issue is not only the pollution problems generated during burning, but most important, improved soil fertility conservation, lower consumption of herbicides and the possibility of using part of the residues as fuel, animal feed or raw material. **Further, the use of fertilizers can be reduced significantly, and in some cases even eliminated, under advantageous economic conditions** (4). Noteworthy examples of alternatives that contribute to reducing input of chemical fertilizers, include those recycling in the field the wastes and residues of the industry such as filter mud, and the liquid effluents as irrigation water. In Cuba, it has been a widespread practice for many years to use residuals in cane irrigation, a practice referred to as ferti-irrigation. Likewise, irrigation of cane fields with the vinasse obtained as a waste from alcohol distilleries is a generalized practice in Brazil. These practices, handled with adequate control, not only solve the problem of how to dispose of liquid wastes but also make an important contribution of both the organic and mineral materials required by the soil. Both filter mud and agricultural crop wastes may be improved considerably with regard to their value as fertilizer through relatively simple compost processes, whereby ashes from bagasse furnaces and other elements contributing phosphorous and potassium – of great importance to the crop -- are added. The application of minimum tilling methods or localized tilling in cane acreages has been another element of significant economic importance and contribution to improved soil conservation. Several specially-designed alternatives or techniques have been used on a widespread basis in the various types of soils, with highly beneficial results. The struggle to combat pests that attack sugar cane is carried out entirely through biological methods. Control of the sugar cane borer (Diatrea Saccharilis) is achieved through the systematic reproduction and release of a natural enemy, the Cuban fly Lixophaga Diatrea. Cane diseases are confronted through the ongoing development and inclusion of new commercial varieties, a well-established practice in most of the principal sugar cane-producing countries. Crop rotation and inter-cropping, although practised only to a limited extent at present, have shown an excellent economic possibility and positive effect for cane, basically when used with beans, peanuts and the leguminous genus in general. Industrial Processing - Diversification Cane is not only a plant that grows at a faster rate than other commercial crops and can be cultivated with sustainable techniques. The structural and chemical composition of sugar cane makes it particularly appealing for transformation into valuable products through industrial processing. For years, sugar has been the principal, and virtually only commercial product obtained from cane. Probably the only exception, and then only fairly recently, is the Brazilian alcohol fuel programme. The objective is both, to take advantage of cane for other purposes different from sugar, such as use of the by-products of the sugar industry and sugar itself as raw materials to obtain products with a high aggregate value and of interest to the market. This is what the so-called diversification consists of. The concept of diversification mentioned above and its economic and strategic importance for cane-producing countries has been the focus of attention at several international fora in the past few years. A study of the alternatives for diversification of sugar cane calls for an analysis of the different fractions that make up its vegetative structure, which are shown in Table 1. TABLE 1: VEGETATIVE STRUCTURE OF SUGAR CANE ( % OF DRY MATTER ) A study of the tables above clearly shows the importance of bearing in mind the potential use of the so-called agricultural wastes (tops + leaves), which represent nearly 40 % of the total weight. Likewise, the clean stalks are made up mainly of soluble sugars; and bagasse constitutes the lignocellulose portion. Soluble sugars, both those taken directly from cane juice and those extracted during the intermediate currents of the sugar process (filter juice, A or B molasses) or from final molasses may be transformed into products with a high value and market interest through chemical or biotechnical processes. Table 3 below shows some of the principal products manufactured today on a commercial scale. TABLE 3: SOME DERIVATIVES OF CANE SUGARS **The main advantage of using cane juice for these products**, rather than molasses, **is the possibility of having the bagasse as an energy source capable** of satisfying the thermal and **electrical demands of the industrial process**. This is the case of the traditional sugar industry and of alcohol production as carried out in Brazil, **directly from cane. As will be seen further on, with this system it is not only possible to satisfy the energy requirements of the process but to obtain significant surplus electricity as well.** For its part, **cane bagasse represents a renewable source of fibrous raw material**, which can replace wood in many of its applications. Various types and selections of top-quality agglomerated boards are produced from cane bagasse at present. It is estimated that world installed capacity for bagasse boards of different types totals approximately 800.000 cubic meters annually; nonetheless, this still represents only 2% of the total production volume. In Cuba, there are five bagasse board factories, which produce the so-called particle board (low density). One of them has a double production line, where the Mende, or medium density type is also manufactured. Likewise, paper and cardboard of excellent quality may be obtained from bagasse, capable of competing with equivalent products obtained from wood. The only area in which bagasse is at a disadvantage compared to wood is the type of paper used for industrial purposes, which calls for high tenacity. This is impossible to achieve with bagasse due to the features of its fiber, which is shorter than soft woods. The ever-increasing awareness at the international level of the need to preserve the forests that still exist in tropical and subtropical regions, and the restrictions on further development the extraction of commercial areas in temperate regions, open up interesting prospects for products made from bagasse fiber, which in addition to being an annually renewable source, **may be processed through less intensive, and therefore less aggressive to the environment** technologies, than traditional wood sources. Cane for Animal Feed In countries with tropical and subtropical climates, which is where sugar is produced, animal feed availabilities are one of the most crucial economic problems. For many years, the attempts to transfer models based on the use of grains and cereals have proven not to be economically feasible. Sugar cane and the by-products of the sugar industry can, nonetheless, represent fundamental feed support for both rumiants and swine, as shown by international experience. For cattle feed, there is a wide range of experience in the comprehensive use of cane, with good production indicators and economic results, when combined with an adequate supply of cane pieces or chopped cane. Glucogenic precursors such as those obtained from grain residues (rice for example), and small amounts of genuine protein, both vegetable and animal (a significant part of assimilable nitrogen requirements can be furnished through urea) must also be added. Bagasse or its pith have been used in cattle feed, for both dairy cattle and fattening. For many years a treatment for pith was used in Cuba to increase its digestibility, using sodium hydroxide and adding final molasses and urea. More recently, this technology has been replaced by a more economical alternative, in which the fiber is pre-digested using lime. In Brazil, there is a wide range of experience in fattening cattle using bagasse hydrolized with steam as a base. Although this option requires a larger investment for building treatment facilities, it has the advantage that chemicals are not needed. Compared to grains and cereals, the principal restriction of sugar cane as feed for monogastric animals is the fact that it has virtually no protein. Nonetheless, by-products of the sugar industry are perfect as a cheap source of metabolizable energy in swine feed diets. A solution must be found to contribute protein in diets, which may be achieved through protein concentrates such as soybean or fish flours. Fodder (torula) yeast has been used on a large scale in Cuba as a protein concentrate for swine feed. It is produced at industrial plants through aerobic fermentation of final molasses. Saccharomyces yeast, another sugar cane derivative, obtained as a by-product of alcohol distilleries, is another highly economically feasible alternative. Brazil is unquestionably the country with the greatest potential for this option; and in fact, yeast recovery has been on the rise over the past few years. The technical and economic feasibility of swine rations based on intermediate molasses from sugar factories, and yeast from alcohol distilleries has been proven on a commercial scale in both Cuba and Brazil. Sugar Cane and Energy **The high photosynthetic capacity of sugar cane makes it an important source of energy**. A comparison of the energy value of the cane biomass and the energy consumed in its harvest and cultivation shows a ratio of 20:1. This makes sugar cane a biomass of enormous interest at present, as alternatives are under study to reduce the rate of gas accumulation and consequent global warming, as a result of the use of fossil fuels. **The cane sugar industry creates its own fuel, bagasse, which is not only capable of satisfying the energy demands of the factory but generating surplus electricity, with the consequent ecological and economic benefits.** The traditional sugar mill is highly inefficient from an energy standpoint, since it was designed to not be forced to have bagassesurpluses. On average, steam consumption for the process ranges between 450 and 550 kg of steam per tone of cane processed. Nonetheless, consumption of under 300 kg / t is possible to achieve, with schemes and equipment well-known and widely used in the beet sugar industry. L**ikewise, the furnaces in which the bagasse has traditionally been burned for steam** production have energy efficiency rates of approximately 60-65%; whereas **it is possible to achieve efficiency rates of nearly 90%,** with heat-recovery designs and systems to reduce the final temperature of combustion gases. These traditional energy schemes were designed to obtain precisely the electrical power required by the factory as the steam produced by low-pressure turbogenerators passes through. In order to produce surplus electricity at the sugar factory, steam consumption must be reduced in the process, furnace efficiency must be improved; and at the same time, steam generation pressure must be increased. In this case, it is possible to obtain surpluses of up to 100 kw-hr per ton of milled cane, as proven by experiences on a large scale in Hawaii, Reunion Island and Florida. **New technologies currently in the development stage**, based on gasification of the biomass and use of gas turbines and combined cycles**, would make it possible to increase the generation potential of the sugar industry to levels approximately twice those mentioned above.** Further, the use of agricultural residues of the cane harvest to produce energy would also make it possible to double the factory potential and use facilities during the between-crop period. **In Cuba, there are experiences on a commercial scale with use of cane straw as fuel in mill furnaces**; and work is currently underway on studies to perfect this and storage methods. And lastly, **from an energy and environmental standpoint, it is absolutely essential to mention the strategic importance of ethyl alcohol production from cane**, for use as automotive fuel. The experience of Brazil is well-known and has been discussed in depth at the international level.

#### Ethanol good for environment—reduces GGEs

**Layton 2011**(Julia Layton: B.A. in English literature from Duke University; How stuff works (side-channel for discovery): "Is Ethanol Really More Eco-friendly than Gas?"  <http://auto.howstuffworks.com/fuel-efficiency/alternative-fuels/ethanol-facts1.htm>.)

**In the energy industry, the need for change is no longer debatable.** Beyond the danger of complete dependence on foreign oil when both global politics and gas prices are more volatile than ever, **the environmental impact of burning millions of gallons of fossil fuels faster than we can say "greenhouse gases" is beginning to sink into the general consciousness.** So what's **the answer**? Some say it's hydrogen, which **is** a brilliant alternative but ultimately raises some complex questions about safety. Others point to natural resources like sunlight and wind. Parts of the renewable-energy industry are pretty keen on **ethano**l, as well -- how can you argue with the wisdom of powering our cars with bountiful corn? Apparently, you can argue with it, and many people are. First, a quick primer on what ethanol is and how it's made. Ethanol is grain alcohol. In the United States, it's usually made from corn. In Brazil, it's most commonly made with sugarcane. Wheat, barley and potatoes are also sources of ethanol. There are a couple of ways to make fuel-grade ethanol, and one of the most common ones is the dry-mill method, which goes something like this: The corn (or other grain) passes through a grinding meal. It comes out as a powder. A mixture made of this grain powder, water and an enzyme enters a high-heat cooker, where it's liquefied. The enzyme helps to break down the grain compound to aide in the liquefaction process. The liquefied mash is cooled, and another enzyme is added to the mix. This enzyme converts the starch into sugars that can be fermented to create alcohol. Yeast is added to the sugar mixture to begin the fermentation process. The sugars break down to ethanol (a form of alcohol) and carbon dioxide. The fermented mixture is distilled. The ethanol separates from the solids. A dehydration process removes water from the separated ethanol. A small amount of gasoline is added to the ethanol in order to make it undrinkable. All ethanol used as a fuel must be made nonpotable. By products of this process, including ­distiller's grain and carbon dioxide, are useful in the farming and ranching industries and may be sold by the ethanol-manufacturing plant for various purposes. But according to many experts in agriculture, making ethanol a major player in the fuel industry has serious drawbacks. In this article, we'll look at what makes ethanol a potentially good source of clean energy -- and find out why some people think this potential is limited. In its current status as a low-percentage fuel additive, **the benefits of ethanol are obvious.** **Since ethanol contains a lot of oxygen in its chemical structure, it burns pretty cleanly.** Added in small amounts (typically one part ethanol, nine parts gasoline) to the gasoline that fuels our cars, **it reduces greenhouse emissions like carbon monoxide and nitrogen oxides.** **Argonne National Laboratory reports an approximate 10-ton (9.07-metric ton) decrease in greenhouse-gas emissions resulting from the use of ethanol fuel in 2007 alone** [source: Biofuels Digest]. A 2006 study in Wisconsin showed 16 percent fewer high-ozone days since the 1994 introduction of 10-90 fuel [source: Ethanol]. The addition of ethanol to the fuel mix also reduces the amount of gasoline we consume when we drive, and any car can run on this 10-90 ethanol mix (called E10). The **85-15 ethanol mix** (called E85) that only fuels special flexible fuel vehicles (FFVs**) burns even more cleanly**, **further reducing the release of harmful gases into the atmosphere that can cause air and water pollution, global warming and smog.**

# Corn Ethanol Bad

### Corn Unsustainable

#### No offense, corn-based ethanol is unsustainable

Segelken 7 [Roger , November 10th, “Ethanol Fuel from Corn Faulted as ‘Unsustainable Subsidized Food Burning’”, <http://healthandenergy.com/ethanol.htm>, Cites: Cornell professor in the College of Agriculture and Life Sciences. Pimentel, who chaired a U.S. Department of Energy panel that investigated the energetics, economics and environmental aspects of ethanol production several years ago]

Aug. 8, 2001 — ITHACA, N.Y. -- Neither increases in government subsidies to corn-based ethanol fuel nor hikes in the price of petroleum can overcome what one Cornell University agricultural scientist calls a fundamental input-yield problem: It takes more energy to make ethanol from grain than the combustion of ethanol produces.¶ At a time when ethanol-gasoline mixtures (gasohol) are touted as the American answer to fossil fuel shortages by corn producers, food processors and some lawmakers, Cornell's David Pimentel takes a longer range view.¶ "Abusing our precious croplands to grow corn for an energy-inefficient process that yields low-grade automobile fuel amounts to unsustainable, subsidized food burning," says the Cornell professor in the College of Agriculture and Life Sciences. Pimentel, who chaired a U.S. Department of Energy panel that investigated the energetics, economics and environmental aspects of ethanol production several years ago, subsequently conducted a detailed analysis of the corn-to-car fuel process. His findings will be published in September, 2001 in the forthcoming Encyclopedia of Physical Sciences and Technology .¶ Among his findings are:¶ o An acre of U.S. corn yields about 7,110 pounds of corn for processing into 328 gallons of ethanol. But planting, growing and harvesting that much corn requires about 140 gallons of fossil fuels and costs $347 per acre, according to Pimentel's analysis. Thus, even before corn is converted to ethanol, the feedstock costs $1.05 per gallon of ethanol.¶ o The energy economics get worse at the processing plants, where the grain is crushed and fermented. As many as three distillation steps are needed to separate the 8 percent ethanol from the 92 percent water. Additional treatment and energy are required to produce the 99.8 percent pure ethanol for mixing with gasoline. o Adding up the energy costs of corn production and its conversion to ethanol, 131,000 BTUs are needed to make 1 gallon of ethanol. One gallon of ethanol has an energy value of only 77,000 BTU. "Put another way," Pimentel says, "about 70 percent more energy is required to produce ethanol than the energy that actually is in ethanol. Every time you make 1 gallon of ethanol, there is a net energy loss of 54,000 BTU."¶ o Ethanol from corn costs about $1.74 per gallon to produce, compared with about 95 cents to produce a gallon of gasoline. "That helps explain why fossil fuels -- not ethanol -- are used to produce ethanol," Pimentel says. "The growers and processors can't afford to burn ethanol to make ethanol. U.S. drivers couldn't afford it, either, if it weren't for government subsidies to artificially lower the price."¶ o Most economic analyses of corn-to-ethanol production overlook the costs of environmental damages, which Pimentel says should add another 23 cents per gallon. "Corn production in the U.S. erodes soil about 12 times faster than the soil can be reformed, and irrigating corn mines groundwater 25 percent faster than the natural recharge rate of ground water. The environmental system in which corn is being produced is being rapidly degraded. Corn should not be considered a renewable resource for ethanol energy production, especially when human food is being converted into ethanol."¶ o The approximately $1 billion a year in current federal and state subsidies (mainly to large corporations) for ethanol production are not the only costs to consumers, the Cornell scientist observes. Subsidized corn results in higher prices for meat, milk and eggs because about 70 percent of corn grain is fed to livestock and poultry in the United States Increasing ethanol production would further inflate corn prices, Pimentel says, noting: "In addition to paying tax dollars for ethanol subsidies, consumers would be paying significantly higher food prices in the marketplace."¶ Nickels and dimes aside, some drivers still would rather see their cars fueled by farms in the Midwest than by oil wells in the Middle East, Pimentel acknowledges, so he calculated the amount of corn needed to power an automobile:¶ o The average U.S. automobile, traveling 10,000 miles a year on pure ethanol (not a gasoline-ethanol mix) would need about 852 gallons of the corn-based fuel. This would take 11 acres to grow, based on net ethanol production. This is the same amount of cropland required to feed seven Americans.¶ o If all the automobiles in the United States were fueled with 100 percent ethanol, a total of about 97 percent of U.S. land area would be needed to grow the corn feedstock. Corn would cover nearly the total land area of the United States.

#### SQ Corn prick shocks inevitable—crushes viability of U.S. ethanol

Specht 13

[Jonathan-J.D. Wash. U St. Louis, Legal Advisor, “Raising Cane: Cuban Sugarcane Ethanol’s Economic and Environmental Effects on the United States,” Environmental Law & Policy Journal, Univ. of California Davis, Vol. 36:2, <http://environs.law.ucdavis.edu/issues/36/2/specht.pdf>]

D. Ethanol and the Drought of 2012

Events in the summer of 2012 highlighted both the potential risks of continuing to center U.S. biofuels policy on domestic corn production and the potential benefits of promoting the growth of a Cuban sugarcane-based ethanol industry. In the summer of 2012, the U.S. Midwest experienced its worst drought since 1956. n184 In the middle of August 2012, more than twenty-two percent of the contiguous United States was considered to be in one of the two [\*202] most severe categories of drought. n185 High temperatures and lack of rain combined to devastate productivity of U.S. crops, especially corn, 40 million acres of which were in drought areas. n186 According to a USDA report, the U.S. corn crop of 2012 was projected to be the smallest since 2006, n187 despite the fact that significantly more acres of land were planted with corn in 2012 as compared to 2006. n188

As a result of anticipated lower supplies, corn prices shot up to record levels in the summer of 2012. n189 In response to these high prices, livestock producers affected by high grain prices and others, including members of Congress and four state governors, called on the Obama Administration to temporarily suspend the RFS, and thereby reduce pressure on commodity prices by the ethanol industry. n190 Criticism of current U.S. ethanol policy was not limited to livestock producers - Joze Graziano da Silva, head of the U.N. Food and Agriculture Organization, also called for a temporary suspension of the RFS. n191 As critics of U.S. ethanol policy pointed out, the drought of 2012 and the destruction it inflicted on corn production in the United States show the danger of relying on a single crop as a source for fuel production.

### Corn High Now

#### Corn prices high now—driving record corn planning

Mallett 13

[Rebecca-researcher focused on agriculture and food manufacturing, business services, “2013 Corn Prices Rise as Yields Suffer,” Bizmology-Business viewpoints from the editors at Hoover’s, Jan. 22, <http://bizmology.hoovers.com/2013/01/22/2013-corn-prices-rise-as-yields-suffer/>]

The 2013 US corn crop will be shaped by two forces: severe drought and soaring prices. In hopes of avoiding crop losses from persisting drought conditions, some US corn farmers will be converting acreage to soybeans in 2013. Others will take their chances with suboptimal moisture levels, plant more corn, and hope high prices make up for any lost crops. High corn prices in recent years, partly due to ethanol demand, drove many farmers to repeatedly plant corn year after year. Repeated planting can deplete soil of nutrients and reduce yields. The plan for high prices to offset the possible yield reductions was not successful for many farmers in 2012. Plagued by the worst US drought in decades, corn yields were disappointing. Farmers harvested 10.7 billion bushels of corn in 2012, the lowest harvest in six years, according to the USDA. Poor corn yields prompted some farmers to now look to soybeans, which are less dependent on moisture and naturally add needed nitrogen to the soil. Many farms in Iowa and Illinois, the highest corn-producing states, are expected to switch to soybeans. US corn yields may dip by as much as 320 million bushels in 2013 as a result, according to Reuters. At the same time, the US corn stockpile is expected to drop to a 17-year low in summer 2013. The tight corn supply may push prices up even higher. Despite the predictions of continued drought conditions and the risks of repeated corn plantings, rising prices may tempt some farmers to increase corn acreage. Monsanto and other industry insiders forecast 2013 corn plantings at near record highs. So which planting tactic is best for corn farmers? A conservative bet or upping the ante? Replanting and increasing corn acreage could damage the soil and present future problems. Crop rotation may secure better yields in the future, but farmers could miss out on the soaring prices in 2013. Both options seem to present risks and rewards.

### Ground Water Ext

#### Corn ethanol contaminates ground water

WaterWired.com 2007

(Global Warming: Water and Other Wars Looming?, <http://aquadoc.typepad.com/waterwired/2007/04/ethanol_corn_an.html>)Another issue is pollution. In Iowa there have been some instances of water pollution from refineries. But another more insidious problem deals with the switch from soybeans to corn. Soybeans are nitrogen-fixers and require less fertilizer than corn. That means farmers who switch to corn may not only be increasing their water use, but may also run the risk of polluting ground water and/or contributing to algal blooms in surface water because of increased fertilizer use. Let us not forget the hypoxia in the Gulf of Mexico, exacerbated by nutrients in runoff derived from Midwest farms. And, since much fertilizer comes from natural gas, what was that about reducing our dependency on foreign energy?

#### **Domestic ground water pollution causes extinction**

Miller 4

[Prof of Geology, 04, http://www.geosun.sjsu.edu/~jmiller/Geo1\_Lecture12\_SurfaceProcesses.html, 08-Dec-2004 EARTH SURFACE PROCESSES II: GROUNDWATER]

Groundwater is extremely important because it is a source of clean drinkable water for human survival. In arid areas especially (like the western U.S.) it has allowed humans to flourish and in the early part of the colonization of the west it was vital to the establishiment of agriculture because we tapped the groundwater by digging wells and then used it to irrigate our crops. It is still important today for this reason (although we also now impond water in dams and divert it for agriculture using aqueducts). As the population of the west has grown, the demands put on groundwater to provide for human well-being have been increasing, and their is great concern today about how long our groundwater will last, and whether or not we can make sure that it is clean and drinkaable over the long term. It is for this reason, one of the most pressing environmental issues faced by citizens the world over.

### Water Mgt. Mpx

#### Peak water coming—management is key

Mother Earth News, 12

[“Ogallala Aquifer Depletion Affects Midwest Farmers,” Aug. 10, 2012, <http://www.motherearthnews.com/homesteading-and-livestock/ogallala-aquifer-depletion-zwfz1208zhun.aspx>]

The Ogallala and other aquifers around the globe are threatened by overuse and insufficient recharging. ¶ Even in good years, farmers in the Midwest supplement rainfall with irrigation from the Ogallala Aquifer. The U.S. aquifer map shows crop irrigation areas in blue; the darker the color, the heavier the irrigation. That big, dark patch in the middle, to the left of the little icon, is irrigated by both surface water and water from the Ogallala and other aquifers in the High Plains system.¶ The Ogallala spreads across 174,000 square miles, providing drinking water and irrigation to a huge swath of the United States, replenished slowly by rainfall in the region. It’s a critically important resource, which is why it’s been a big part of the Keystone XL fight — if it’s polluted by tar-sands oil, the damage could be catastrophic.¶ The Ogallala and other aquifers around the globe are also threatened by overuse. According to research published this week in Nature, “about 1.7 billion people live in areas where groundwater resources and/or groundwater-dependent ecosystems are under threat.” Researchers estimate that the amount of water being used is 3.5 times the size of the aquifers.¶ The world aquifer map shows aquifers around the world. Any splash of color is an aquifer, the color denoting the body of water’s health. Blue aquifers are healthy — taking in about as much water from precipitation as is extracted. The more red the aquifer, the worse the condition it’s in. The Ogallala, which is part of the High Plains aquifer system, is not in good condition. Along the bottom of the map, you can see several aquifers (including High Plains) displayed within large gray shapes. That gray shape represents how big the surface footprint of the aquifer would need to be in order to collect enough rainfall to replenish what is withdrawn. We’re pulling much more water out of the High Plains aquifer than we’re putting in.¶ Scientific American explains what Ogallala aquifer depletion could mean:¶ The problem with drawing too much water from an aquifer, which has been stored in these geologic formations for thousands of years, is that it can’t easily be restored once pumped dry. … Once pumped dry, the Ogallala would take at least 6,000 years to refill.¶ Another complication of pumping too much water from an aquifer is that creeks will run dry and surface waters can literally be sucked back underneath the surface. That’s not good for wildlife.¶ And from NPR:¶ Some of these aquifers are being exploited at a stunning rate, but what’s truly alarming is how many people depend on that over-exploitation for their food. These aquifers include the Upper Ganges, covering densely populated areas of northern India and Pakistan, and the North China plain, which is the heart of corn-growing in that country. The aquifer of Western Mexico has become a large source of fruit and vegetable production for the U.S.¶ The High Plains aquifer in the United States, meanwhile, is having a particularly bad year. Farmers are pumping even more than usual, because of the drought afflicting this part of the country, and it is getting less replenishment from rainfall. So water levels in the aquifer are falling even faster, leaving less water for the region’s rivers, birds, and fish.¶ Aquifers in India and Saudi Arabia and Iran are in much worse shape than the Ogallala/High Plains. And on the southern border of the U.S., we’re also pulling water out much more rapidly than it is being replaced. And once it’s gone, the impact on crop production in all of these locations will be immediate.¶ Without changes in irrigation and water use, the aquifers can’t be sustained. And reaching peak water in agricultural regions would be much worse than reaching peak oil. Not only for those regions, their people and animals — but for the rest of the world.

### Dead Zone Ext

#### Corn ethanol– destroys soil and the environment and causes dead zones

Hartman, 8

[Eviana-reporter, Washington Post, 3/9, <http://www.washingtonpost.com/wp-dyn/content/article/2008/03/06/AR2008030603294.html>]

High-fructose corn syrup "may be cheap in the supermarket, but in the environment it could not be more expensive," Michael Pollan, author of "In Defense of Food: An Eater's Manifesto" (Penguin Press, 2008), writes in an e-mail.¶ Most corn is grown as a monoculture, meaning that the land is used solely for corn, not rotated among crops. This maximizes yields, but at a price: It depletes soil nutrients, requiring more pesticides and fertilizer while weakening topsoil.¶ "The environmental footprint of HFCS is deep and wide," writes Pollan, a prominent critic of industrial agriculture. "Look no farther than the dead zone in the Gulf [of Mexico], an area the size of New Jersey where virtually nothing will live because it has been starved of oxygen by the fertilizer runoff coming down the Mississippi from the Corn Belt. Then there is the atrazine in the water in farm country -- a nasty herbicide that, at concentrations as little as 0.1 part per billion, has been shown to turn male frogs into hermaphrodites."¶ Milling and chemically altering corn to form high-fructose corn syrup also is energy-intensive. That's not to say that corn is evil and other foods aren't; all crops require energy to grow and transport. What makes corn a target is that federal subsidies -- and tariffs on imported sugar -- keep prices low, paving the way for widespread use of high-fructose corn syrup and, in the process, keeping the American palate accustomed to the sweetness it provides.

### Soil Depletion Mpx

#### Soil depletion causes extinction

**Horne and McDermott 2001** (James and Maura, Kerr Center for Sustainable Agriculture, “The Next Green Revolution: Essential Steps to a Healthy, Sustainable Agriculture”, p. 69, Google Print)

Topsoil is crucial to agriculture. This first step-creating and conserving healthy soil-is the foundation of a sustainable agriculture. It is closely linked to the next two steps-conserving water and protecting its quality, and managing organic wastes and farm chemicals so they don't pollute. How well agriculture manages soil, water, and organic wastes will determine its future health. Conserving healthy soil by guarding it against erosion and other forces that would degrade it is the most basic step. This step has as its corollary actively building soil health, because soil used for agricultural purposes today is not as healthy as it could be. It is both less diverse and less active biologically. Without healthy topsoil, the world cannot begin to feed its billions. Although American popular culture discourse in recent years has speculated on the fate of live on earth in case of alien invasion, asteroid bombardment, or rampaging killer viruses, the slow loss of quality soil is more of a threat to life on the planet than any of these scenarios.

#### Soil Loss=Extinction

Jack Santa Barbara et al., Director, Sustainable Scale Project, International Forum on Globalization, THE FALSE PROMISE OF BIOFUELS, September 2007

“The nation that destroys its soil destroys itself.” —President Franklin D. Roosevelt “We stand, in most places on earth, only six inches from desolation, for that is the thickness of the topsoil layer upon which the entire life of the planet depends.”26 Loss of topsoil has been a major factor in the fall of civilizations over the ages, and it could happen again.27 Fertile soil is far more than dirt. It is a complex substance composed of mineral matter from its parent rock, and organic matter from its living organisms.28 The organic matter is broken down by millions of micro-organisms per cubic foot in the soil which recycle the nutrients, and create tunnels through which air and water can circulate, making even more nutrients available to the root systems of plants. Soil quality varies greatly from place to place. It takes hundreds of years to form even 1 inch of topsoil.29 Consequently, good soil is a precious resource and essential for a secure food supply. Unfortunately, both the quantity and quality of soil is now in rapid decline globally. Only 35 percent of global arable land is free from degradation. Studies estimate that approximately 40 percent of the world’s agricultural land is seriously degraded, with significant impacts on the productivity of about 16 percent of agroecosystems.30 During the last decade, per capita available cropland decreased 20 percent.31 The U.S. is not exempt from this destruction of fertile soil. For example, Iowa has some of the best topsoil in the world, but in the past century, half of it has been lost.32 Productivity drops off sharply when topsoil depth thins to 6 inches or less, the average crop root zone. On over half of America’s best crop land, erosion is 27 times the natural rate33 of about 400 pounds of soil per acre per year. This is an enormous loss of a precious resource that cannot be easily or quickly replaced. This loss of soil is directly the result of industrial agricultural practices including corn production. It will take centuries for nature to replace it. Corn production in particular is associated with high rates of soil erosion, with rates as much as 100- 2500 times greater than for pasture grasses.34 Continued erosion at the current pace will result in the loss of over 30 percent of the global soil inventory by the year 2050.35

#### Soil erosion causes extinction

Asabe 2 (American Society of Agricultural Engineers, “In Defense of Soil and Water Resources in the United States: Soil Erosion Research Priorities”, December, http://www.asabe.org/pr/soilerosion.html)

Our soil resource is vital to the survival of the human race. Not only does it provide the literal foundation of our existence, it is the source of most of the agricultural products that sustain us and our way of life—food, fiber, timber, and energy. Because damages to soil quality are nearly always permanent, preservation of this resource is critically important to maintaining agricultural productivity and environmental quality. One of the most widespread threats to soil quality is wind and water erosion, an ever-occurring process that impacts our lives in numerous ways, the direst of which is lost food production. It is estimated that soil erosion is damaging the productivity of 29% (112 million acres) of U.S. cropland and is adversely affecting the ecological health of 39% (145 million acres) of rangeland. In addition to on-site soil loss, erosion results in off-site sediment movement that can cause problems downstream. Sediment can deposit and clog drainage ways, increase potential for flooding, decrease reservoir capacity, and carry nutrients and pesticides that degrade water quality. Current assessments by the U.S. Environmental Protection Agency of impaired water bodies indicate that 40% of the stream miles and 45% of the lake and reservoir areas are impaired because of sediment. Therefore, minimizing erosion is not only important for saving the soil, it is essential for preserving potable water resources and improving water and air quality.

#### 3 billion lives depend on abundant topsoil

Pimental 00 (David, Professor of Agriculture Science – Cornell University, Bioscience, November**,** http://www.aibs.org/bioscienceeditorials/editorial\_2000\_11.html)

More than 99% of food worldwide comes from the soil ecosystem. Rapid erosion of soil is reducing food production and causing serious losses in biodiversity. Over the past 40 years, approximately 30% of the world’s cropland has become unproductive, which has contributed to the malnourishment of more than 3 billion people. Soil erosion on US cropland each year averages about 13 tons per hectare, or 13 times more than sustainable soil formation. In Africa, Asia, and Latin America, where soil erosion is intensifying, it ranges from 30 to 40 tons per hectare, leaving the land unprotected from rainfall and wind energy. Adding insult to injury is the fact that forestland is garnered to replace the abandoned agricultural land. This accounts for more than 60% of the world’s deforestation and is the major cause of loss of biodiversity. Another concern is the estimated $20 billion cost of fertilizer nutrients that are lost each year through soil erosion. The soil, with its nutrients and pesticides, is washed into streams and lakes, where it causes serious pollution problems for fish and other aquatic organisms. The offsite environmental and health impacts from soil erosion are estimated at an additional $18 billion per year. Not to be ignored is the concern raised by the extremely slow rate of soil replacement. It takes approximately 500 years to replace 25 millimeters (1 inch) of topsoil lost to erosion. The minimal soil depth for agricultural production is 150 millimeters. From this perspective, productive fertile soil is a nonrenewable, endangered ecosystem. Soil and biological scientists face many challenges and opportunities. With the world’s population estimated to reach 8-10 billion by 2050, the wise use of soil ecosystems will become increasingly important for meeting food production needs.

#### Soil key to agricultural production

Alois and Chen 7 (Paul and Victoria, The Arlington Institute, “Keystone Species Extinction Overview”, July, http://www.arlingtoninstitute.org/wbp/species-extinction/443)

While topsoil is not a living organism, it is the foundation of the Earth’s terrestrial ecosystems and is loosely analogous to plankton. Topsoil refers to far more than just dirt: it is actually a very complex micro ecosystem made up of numerous different forms of life. One teaspoon of topsoil contains 5 billion bacteria and 20 million fungi; a square meter can contain 12 million nematodes, 120,000 mites, 20,000 pot worms, 8,000 slugs and snails, 2,000 earthworms, and thousands of insects of various species.[[27]](http://www.arlingtoninstitute.org/wbp/species-extinction/443" \l "_ftn27" \o "_ftnref27) It can take centuries for just an inch of topsoil to form naturally, and careless destruction of the existing topsoil cannot be easily reversed. Without healthy topsoil, food production is virtually impossible. Ironically, the main cause of soil degradation has historically been agriculture. Consumption of food has increased globally, yet this increase is only destroying topsoil at a faster rate. The United Nations Environment Program estimates that over the last 10,000 years, 2 billion hectares of productive land have been destroyed by human activities.[[28]](http://www.arlingtoninstitute.org/wbp/species-extinction/443" \l "_ftn28" \o "_ftnref28) When compared to the 1.5 billion hectares of land being used for agriculture today, that number is very significant. Soil degradation has the potential to threaten global food security, and it is already a major issue in many parts of the world today.

## Sugar > Corn

### Sugar Solves Warming

#### Sugarcane ethanol can contribute significantly to the reduction of green house gas

UNICA 10 (UNICA, the leading trade association for the sugarcane industry in Brazil, “EPA Reaffirms Sugarcane Biofuel is Advanced Renewable Fuel with 61% Less Emissions than Gasoline”, Sweeter Alternative, a web site developed by UNICA that focuses on renewable energy options, 2/3/10, http://sweeteralternative.com/for-media/press-releases/epa-reaffirms-sugarcane-biofuel-is-advanced-renewable-fuel-with-61-less-emissions-than-gasoline//HZ)

The U.S. Environmental Protection Agency (EPA) has confirmed that ethanol made from sugarcane is a low carbon renewable fuel, which can contribute significantly to the reduction of greenhouse gas (GHG) emissions. As part of today’s announcement finalizing regulations for the implementation of the Renewable Fuel Standard (RFS2), the EPA designated sugarcane ethanol as an advanced biofuel that lowers GHG emissions by more than 50%.¶ “The EPA’s decision underscores the many environmental benefits of sugarcane ethanol and reaffirms how this low carbon, advanced renewable fuel can help the world mitigate against climate change while diversifying America’s energy resources,” said Joel Velasco, Chief Representative in Washington for the Brazilian Sugarcane Industry Association (UNICA).¶ Sugarcane ethanol is a renewable fuel refined from cane that grows typically in tropical climates. Compared to other types of ethanol available today, using sugarcane ethanol to power cars and trucks yields greater reductions in greenhouse gases and is usually much cheaper for drivers to purchase. Brazil has replaced more than half of its fuel needs with sugarcane ethanol – making gasoline the alternative fuel in that country and ethanol the standard. Many observers point to sugarcane ethanol as a good option for diversifying U.S. energy supplies, increasing healthy competition among biofuel manufacturers and improving America’s energy security.¶ The RFS2 will help the United States meet energy security and greenhouse gas reduction goals sought by the Energy Security and Independence Act of 2007 (EISA). The new regulations establish minimum biofuels consumption in the U.S. of more than 12 billion gallons (45 billion liters) in 2010, rising to 36 billion gallons (136 billion liters) in 2022, of which 21 billion gallons per year would have to be one of three types of advanced biofuels: cellulosic, biomass diesel, and “other advanced,” that meet required GHG reduction thresholds as determined by the EPA.¶ Today, EPA affirmed that sugarcane ethanol meets the “other advanced” category in the RFS2, although with a GHG reduction level that exceeds the requirement for all categories as well. Specifically, EPA’s calculations show that sugarcane ethanol from Brazil reduces GHG emissions compared to gasoline by 61%, using a 30-year payback for indirect land use change (iLUC) emissions.¶ “We are pleased that EPA took the time to improve the regulations, particularly by more accurately quantifying the full lifecycle greenhouse emission reductions of biofuels. EPA’s reaffirmation of sugarcane ethanol’s superior GHG reduction confirms that sustainably-produced biofuels can play a important role in climate mitigation. Perhaps this recognition will sway those who have sought to raise trade barriers against clean energy here in the U.S. and around the world. Sugarcane ethanol is a first generation biofuel with third generation performance,” noted Velasco.¶ Last year, UNICA submitted comments to EPA with abundant scientifically credible evidence showing that — even including indirect emissions — sugarcane ethanol has a reduction of GHG emissions of 73-82% compared with gasoline, on a 30- or 100-year time horizon respectively. The RFS2 requires the use of at least 4 billion gallons (over 15 billion liters) of “other advanced” renewable fuels a year by 2022. In 2010, the RFS requires 200 million gallons of this type of advanced renewable fuels.¶ “While we are reviewing the final rule, it is clear that EPA has incorporated many of the comments that UNICA and other stakeholders made during the public process. EPA should be congratulated for the way it upheld the Obama’s goals of transparency and scientific integrity in the environmental rulemaking. And we hope that other governments should take note of the manner that EPA has handled this process,” concluded Velasco.¶ Brazil is a leader in the production of sugarcane ethanol, which is widely considered as the most efficient biofuel available today. In 2009, Brazil produced over 7 billion gallons of sugarcane ethanol, most of which is used in Brazil in flex fuel vehicles. As a result of Brazil’s innovative use of sugarcane ethanol in transportation and biomass for cogeneration, sugarcane is the leading source of renewable energy in the nation, representing 16% of the country’s total energy needs. In fact, gasoline has become the alternative in Brazil, reducing the country’s dependence on fossil fuels lowering emissions. A recent study in the November 2009 edition of the journal Energy Policy indicated that since 1975, over 600 million tons of CO2 emissions have been avoided thanks to the use of ethanol in Brazil.

#### Sugarcane ethanol can help reduce CO2

UNICA 10 (UNICA, the leading trade association for the sugarcane industry in Brazil, “Sugarcane Ethanol Helps Protect the Environment”, Sweeter Alternative, a web site developed by UNICA that focuses on renewable energy options, 2/3/10, http://sweeteralternative.com/environmental-benefits?utm\_source=internal&utm\_medium=mainnav&utm\_campaign=website//HZ)

Leading environmental officials at the U.S. Environmental Protection Agency (EPA) and in California agree: ethanol made from sugarcane is an ideal renewable fuel that can help reduce greenhouse gases while diversifying America's energy resources. EPA has designated sugarcane ethanol as an Advanced Renewable Fuel – an important category of superior biofuels that, along with cellulosic biofuels and others, will make up 21 billion gallons of America’s fuel supply by 2022. This is equal to about 15% of today’s gasoline market. In California, the state’s air regulators have classified sugarcane ethanol as a “low-carbon” fuel that will help reduce greenhouse gas emissions from the state’s transportation sector.¶ ¶ What is it about sugarcane ethanol that makes the fuel so environmentally friendly?¶ ¶ Renewable – Sugarcane ethanol, unlike coal or oil, is produced from sugarcane plants that grow back year after year.¶ Sustainable – Since sugarcane only needs to be replanted every five to seven years – as a semi-perennial crop it can be harvested without uprooting the plant, its cultivation has less impact on the soil and surrounding environment. Learn more about sustainable sugarcane agriculture in Brazil.¶ Efficient Energy Conversion - Sugarcane is highly efficient in converting sunlight, water, soil nutrients and CO2 into stored energy. Also, because the use of fossil energy in the sugarcane industry is low, the ratio of renewable energy output per unit of fossil energy input in the ethanol production cycle is seven times higher for sugarcane when compared to corn.¶ Lower Carbon Emissions – Compared to gasoline, sugarcane ethanol cuts greenhouse gases by more than 60%. That’s better than any other liquid biofuel produced today in large quantities.¶ Due to significant environmental benefits, sugarcane ethanol is pointed out by many observers as a good option for diversifying U.S. energy supplies, increasing healthy competition among biofuel manufacturers and improving America’s energy security.

#### Sugarcane ethanol reduces CO2 emissions

UNICA 10 (UNICA, the leading trade association for the sugarcane industry in Brazil, “Greenhouse Gas Reductions”, SugarCane, a web site developed by UNICA and Apex-Brasil to serve as a global information hub on sugarcane products and their economic, environmental and social benefits around the world, 2/3/10, http://sugarcane.org/sugarcane-benefits/greenhouse-gas-reductions//HZ)

Sugarcane is a low-carbon building block that can be used to produce a wide range of clean and renewable products.¶ Probably the most recognized is sugarcane ethanol which reduces greenhouse gas emissions by 90 percent on average compared to gasoline. That’s the best carbon performance of any biofuel produced at commercial scale. Learn more about sugarcane ethanol’s evaluation and designation by leading environmental regulators in the United States and European Union.¶ Other sugarcane products offer similar low-carbon advantages. Several factors explain why sugarcane can reduce greenhouse gases so significantly compared to other alternatives:¶ Carbon Stocks. In sugarcane fields, carbon stocks amount to 60 tons of carbon per hectare (including above and below ground and soil organic carbon). It means that a lot of carbon is stored in small portions of land, allowing for higher greenhouse gas reductions from the products produced in that area.¶ Semi-Perennial Plant. Sugarcane only needs to be replanted about every six years which reduces tilling of land that releases carbon dioxide. No-till techniques are also strongly encouraged, considerably lowering the amount of fuel necessary to run agricultural machinery in the field.¶ Limited Chemical Use. The application of pesticides in Brazilian sugarcane fields is low and the use of fungicides practically nonexistent. Major diseases that threaten sugarcane are fought through biological control and advanced genetic enhancement programs. Brazilian sugarcane growers also apply relatively few industrialized fertilizers, due to the innovative use of organic fertilizers from recycled production residues. All of it reduces the demand for fossil-based products, improving sugarcane ethanol’s greenhouse benefits.¶ Bioelectricity. Sugarcane mills are energy self-sufficient. They burn leftover stalks and leaves in boilers to produce enough bioelectricity to power their operations and often sell energy back to the grid. Producers can also obtain carbon credits from bioelectricity project.¶ Yields. Each hectare of sugarcane produces more than 7,000 liters of ethanol. It means that with less input, including fossil one, more energy is produced. It boosts greenhouse gas reduction benefits of sugarcane-based products.¶ Since 2003, Brazil’s use of sugarcane ethanol has reduced that country’s emissions of carbon dioxide by 128 million tons. That’s as good for the environment as planting and maintaining 916 million trees for 20 years! These low-carbon benefits from sugarcane will expand with greater production and use of other products like cellulosic ethanol, bioplastics and biohydrocarbons.

### Corn Bad=Warming

#### Corn ethanol bad for the environment-not a carbon sinc, uncertain science

**Cimitile 2009** (Matthew Cimitile: Writer for the US Geological Survey Coastal and Marine Science Center in St. Petersburg, Florida. The Scientific American: “Corn Ethanol Will Not Cut Greenhouse Gas Emissions” <<http://www.scientificamerican.com/article.cfm?id=ethanol-not-cut-emissions&page=3>> scientificamerican.com)

California regulators, trying to assess the **true environmental cost of corn ethanol**, are poised to declare that the biofuel **cannot help the state reduce global warming**. **As they see it, corn is no better – and might be worse – than petroleum when total greenhouse gas emissions are considered.** Such a declaration, to be considered later this week by the California Air Resources Board, would be a considerable blow to the corn-ethanol industry in the United States. If passed, the measure could serve as a model as other states and the federal government tackle carbon emissions. But California's regulators say they have no choice. The state must assess the full climate change impact of corn ethanol under a California law requiring a sharp cut in carbon emissions from transportation fuels. The board must encourage the use of cleaner alternatives like electricity, hydrogen and cellulosic ethanol, said board spokesman Dimitri Stanich. **The proposal would work like this: If increased production of corn-based ethanol in the U.S. raises corn prices and accelerates the conversion of rainforests and conservations lands to farmland worldwide, greenhouse emissions and loss of the carbon sink associated with such deforestation and disruption must be counted towards the biofuel's total emissions.** "Losing a carbon sink would defeat the purpose of this regulation to reduce greenhouse emissions," Stanich said. The regulation is part of California's low-carbon fuel standard to reduce greenhouse emissions from transportation fuels by an average of 10 percent by 2020 or 16 million metric tons of carbon emissions over the next decade. A regional low carbon fuel standard has also been adopted by eleven northeast and Mid-Atlantic states. And President Obama has called for a national low carbon fuel standard. Both efforts are likely to look at California's findings as a model. Federal law requires U.S. transportation fuels contain 36 billion gallons of renewable fuel by 2022, of which 21 billion gallons must be cellulosic ethanol. But an overwhelming majority of ethanol mixed into gasoline today comes from corn. By 2012, about a third of all corn produced in the U.S. will go towards making ethanol, according to the U.S. Government Accountability Office. Proponents say this will create thousands of jobs while reducing carbon emissions. They fear California's rule could stymie that, creating an unfair playing field that only penalizes biofuel production. "We strongly support the low carbon fuel standard," said Roger Salazar, spokesman for Growth Energy, an ethanol advocacy group. "But **the science behind** (California's proposal) **is extremely uncertain**." More than 100 scientists researching biofuel production agree, having signed a letter to California Gov. Schwarzenegger calling the policy misguided and based on limited scientific models that improperly punish corn-based biofuel. "Results from the model have not been verified enough to be useful," said Harvey Blanch, a professor of biochemical engineering at University California, Berkeley, and one of the signatories. "There needs to be more studies validating this method before applying it to a legal framework." This is the first piece of regulation to account for such so-called "indirect land-use effects" of corn-based ethanol. But it is the latest in an ongoing debate about the fuel's effectiveness to reduce greenhouse gases. **Prior research has shown converting corn to ethanol leads to more clearing of rainforests that would do little to slow global warming. A recent study looking at the total climate change and health costs from fuels found that corn-based ethanol equals or exceeds the costs of gasoline.** That study, published February in the Proceedings of the National Academy of Sciences, concluded that the combined climate-change and health costs are $469 million for gasoline, $472 million to $952 million for corn ethanol, and $123 million to $208 million for cellulosic ethanol. Whereas corn ethanol is produced from the edible corn grain, cellulosic ethanol comes from wood, grasses and the non-edible parts of plants. Cellulosic emits fewer greenhouse gases than corn and has minimal impacts on deforestation rate, air pollution and food prices. "If we are going to be using corn-ethanol in any large quantities, we really need to be sure it is having its intended effects," said Jason Hill, a research associate in applied economics at the University of Minnesota and lead author of the PNAS study. Including indirect land-use change is essential, Hill said, especially if policies aim to reduce greenhouse gas emissions. But federal policy is moving in an opposite direction. Pushed by industry and the U.S. Department of Agriculture, the U.S. Environmental Protection Agency is considering upping the percentage of ethanol in the nation's gasoline from 10 percent to 15 percent. All of that, at least in the near-term, would likely come from corn. California's rules, Salazar said, will scare off investors and the investments needed to make biofuels viable, causing more use of oil. To continue advancements towards cellulosic ethanol – which reduces greenhouse emissions by 90% compared to gasoline – and make it more cost competitive, continued investment in corn ethanol is necessary, he said. "You can't really get to the ultimate goal of cellulosic without this corn ethanol bridge," he said. Hill countered that the ethanol industry has grown so fast that it has outpaced the science. The need for precaution is necessary, he said. "If we are going to have policies to reduce greenhouse gas emissions, the burden of proof should be on the fuels to fulfill that policy," Hill said. "**Right now, there is no clear data that shows corn ethanol has the effect of reducing greenhouse gas emission."**

#### Corn ethanol results in increased levels of air pollution and CO2

Wallen 10 (Zachary M. Wallen, J.D. Candidate, University of Arizona James E. Rogers College of Law, 2010, “Far From a Can of Corn: A Case for Reforming Ethanol Policy “, Arizona Law Review, Spring, 2010, LexisNexis//HZ)

Imagining a fuel created from corn immediately conjures an image of an environmentally friendly alternative to the carbon-dioxide emissions and smog that result from burning gasoline. That image, however, is very misleading because burning of ethanol is, in some ways, even more environmentally damaging than burning gasoline. n101 Based on emissions alone, it is unclear whether ethanol is a net plus or minus for the environment. It is important to examine, in detail, ethanol's environmental impact.¶ One of the big environmental issues gasoline presents is that its associated carbon emissions are closely linked to global warming. And indeed, [\*142] ethanol likely results in a decrease in those carbon emissions when compared with the burning of gasoline. n102 Ethanol has other positive environmental effects as well. For example, it can be attributed to the reduction in other airborne pollutants, such as carbon monoxide and benzene emissions. n103 These are significant political considerations because curbing the effects of global warming is an important environmental concern.¶ But, there are disquieting downsides to ethanol that must also be assessed when considering whether it is a viable alternative to gasoline. For example, the EPA found that ethanol use is linked to increases in the emissions of nitrogen oxides, a pollutant. n104 In addition, it found that the production and transportation of ethanol results in increased emissions of sulfur oxides, particulate matter, and volatile organic compounds. n105 Further, ethanol may well be linked to groundwater contamination. n106¶ Another environmental impact of ethanol is much more subtle. With the increase in domestic corn demand by ethanol producers, American corn exports are inevitably squeezed out.n107 With less imported American corn available, developing countries must allocate additional lands for farming and food production in order to meet their nations' food needs. n108Corn crops are grown in the most fertile and traditionally used farming areas, forcing farmers of other crops to find alternative growing locations, leading to increased deforestation.n109 This resulting deforestation will decrease the levels of carbon dioxide exchanged by trees into oxygen, causing a possible increase in global warming. n110¶ [\*143] Another important consideration when weighing the relative value of ethanol is the large quantity of water needed for its production. n111 In fact, Robert Glennon has argued that water is ethanol's true Achilles heel. n112 While it takes ethanol plants approximately four gallons of water to produce one gallon of ethanol fuel, it takes up to 2500 gallons of water to grow a sufficient amount of corn to even produce one gallon of fuel. n113 When one considers that eleven billion gallons of ethanol are produced on an annual basis, this amounts to a tremendous amount of water usage. n114 This prodigious water consumption is especially troubling when viewed in light of present unsustainable levels of domestic water consumption. n115 When considering ethanol's overall environmental impact, it is important to properly weigh the very large quantities of water that are needed to sustain domestic ethanol production. n116 The cost of ethanol's water needs is an easily ignored, but very pertinent, problem in considering ethanol's environmental impact.¶ These tradeoffs between the benefits and burdens of increased ethanol production leave for consideration the relative net impact of ethanol upon the environment as a whole. While it is advantageous to achieve reductions in carbon emissions through ethanol use, n117 the impact upon air quality standards caused by ethanol's increased nitrogen oxides and fine particulate matter n118 draws pause. This tradeoff would only be deemed truly advantageous if an increase in air pollution is preferable to the alternative of a rise in carbon emissions. This is not a choice that many would consider clear-cut.

### Sugar Superior-Efficiency

#### Cuban sugarcane-based ethanol has numerous environmental benefits and is more efficient

Specht 12 (Jonathan Specht, Legal Advisor, Pearlmaker Holsteins, Inc.; J.D.,Washington University in St. Louis 2012, “Raising Cane: Cuban Sugarcane Ethanol’s Economic and Environmental Effects on the United States”, Environmental Law and Policy Journal, Spring, 2013, http://environs.law.ucdavis.edu/issues/36/2/specht.pdf//HZ)

Cuban sugarcane-based ethanol would have the environmental benefits of Brazilian sugarcane-based ethanol without its most obvious negative factor, damaging habitat in the Cerrado. The environmental effects of biofuels depend on a number of factors. Whether or not a given type of biofuel is environmentally beneficial “depends on what the fuel is, how and where the biomass was produced, what else the land could have been used for, how the fuel was processed and how it is used.”115 Taken together, these factors point to sugarcane-based ethanol grown in Cuba as one of the most environmentally friendly biofuels possible. The environmental benefits of using sugarcane to produce ethanol are numerous. First, it is much more energy efficient to derive ethanol from sugarcane than corn. Making ethanol from corn only creates approximately 1.3 times the amount of energy used to produce it, but making ethanol from sugarcane creates approximately eight times the amount of energy used to produce it.116 Second, unlike much of the corn presently grown in Great Plains states, sugarcane grown in Latin America does not need to be irrigated.117 Third, sugarcane requires relatively small amounts of chemical fertilizers, herbicides, and pesticides.118 Fourth, whereas most U.S. ethanol refineries are powered by coal or natural gas,119 sugarcane ethanol refineries can be powered by bagasse, a natural product left over from the sugar refining process.120 In fact, refineries powered with bagasse can even produce more electricity than they need and sell power back to the electric grid.121 Fifth, although corn can only be planted and harvested once a year, in tropical climates sugarcane can be cut from the same stalks multiple times per year.122Each of these factors in favor of sugarcane ethanol is true of ethanol from Brazil as well as of any potential ethanol from Cuba. However, there are additional environmental factors that clinch Cuban sugarcane-based ethanol as one of the most environmentally friendly fuel sources available to the United States under current technology.123 First, because Cuba is closer to the United States, transporting ethanol from Cuba to the United States would require less energy than transporting ethanol from Brazil to the United States (especially if it is used in Florida, an option further explored in the section on economic effects).124Another reason Cuban sugarcane-based ethanol could be one of the most environmentally friendly fuels possible is that Cuba could produce a significant amount of ethanol without any negative impacts on native habitat. A striking amount of Cuban agricultural land — fifty five percent as of 2007 — is simply lying fallow and is not cultivated with anything.125 Although its character may have changed due to years of neglect, this land is not virgin native habitat like the grasslands of North Dakota or the Cerrado of Brazil. Cuba therefore could greatly increase its production of sugarcane, and thus its production of sugarcane-based ethanol, without negative impacts on wildlife habitat. While it is not environmentally perfect — no form of energy is — Cuban sugarcane-based ethanol would raise fewer environmental concerns than the fuel sources it would displace: petroleum, domestic corn-based ethanol, and Brazilian sugarcane based ethanol. Therefore, from a purely environmental perspective, changing U.S. law and policy in order to promote the importation of Cuban sugarcane-based ethanol should be encouraged.

### Corn Bad=Soil and Water

#### Corn ethanol is bad-Polutes soil and aquifers

**Perry 1/16/2013** (Dr. Mark J. Perry: professor of economics and finance in the School of Management at the University of Michigan. The Flint Journal: “Production of corn ethanol as an automotive fuel source should cease” <http://www.mlive.com/opinion/flint/index.ssf/2013/01/guest\_view\_of\_mark\_j\_perry\_pro.html>.)

Cellulosic ethanol made from wood chips, switchgrass, and other sources is still not viable. Consequently, corn ethanol is the only domestically produced biofuel that is available in large quantities to meet the mandates. Corn ethanol is clearly inferior to gasoline as a fuel source for automobiles. Despite a 51-cent-per-gallon tax credit to companies that blend ethanol into gasoline, **ethanol costs about 70 cents a gallon more than gasoline on an energy-equivalent basis. Instead of helping consumers, ethanol provides 27% lower fuel economy than gasoline. Realistically, you have to burn a lot more ethanol-based fuel to create the same amount of energy to power your car, which has unnecessarily driven up the cost of operating a vehicle. And there are serious long-term adverse environmental implications from using corn ethanol. Growing corn to make fuel requires significant amounts of fertilizer and** pesticides that pollute the soil, underground aquifers and waterways. **The National Research Council has determined that corn ethanol uses significantly more water in its production cycle than gasoline.** Over the years, the ethanol lobby has claimed that ethanol would help America achieve energy independence. But the reality is that ethanol has played almost no role yet in reducing U.S. dependence on foreign oil. So far, neither the Administration nor Congress has confronted the fact that 40% of the U.S. corn crop is used to produce ethanol, which has increased retail food prices and strained family budgets in their never-ending struggle to put food on the table. Yet the EPA has twice denied requests to waive the ethanol mandate, most recently in November, even though the corn crop was the smallest in six years due to a severe drought last year in the Midwest. **As the ethanol mandate artificially drives up the production of corn ethanol, more and more people in this country and abroad will have to dig deeper in their pockets to pay for food, underscoring just how misguided the push for ethanol has become as the economy struggles to regain its footing in a sub-par recovery.** The first step to adopting a more sensible ethanol policy is to halt the production of E15, since it is caustic and can ruin car engines, while doing nothing to moderate gasoline prices or improve the environment.

#### Corn ethanol has negative effects on the economy

Wallen 10 (Zachary M. Wallen, J.D. Candidate, University of Arizona James E. Rogers College of Law, 2010, “Far From a Can of Corn: A Case for Reforming Ethanol Policy “, Arizona Law Review, Spring, 2010, LexisNexis//HZ)

The production of American ethanol has also had a sizeable impact on the price demanded for corn. The price of corn has increased dramatically over the past two decades, during which time ethanol production really kicked into high [\*144] gear. n119 For example, in 1990 the average price for a bushel of corn was $ 2.36. n120 Five years later, the price for a bushel of corn had increased to $ 3.24. n121 While the price of corn did dip in the late 1990s, n122 by 2007 it had again returned to mid-1990s levels. n123 One year later, the price of corn had soared to record levels, which previously would have been virtually unthinkable. n124 The price of corn in September 2008 had reached $ 5.37 per bushel. n125 In fact, this price approached corn's all-time high. n126 Some would argue that it is unfair to completely blame ethanol for this spike in corn prices. n127 After all, this was during a period of record-high gasoline prices, which made products across the economy more expensive. n128 In such a period of high fuel prices, it has to follow that the near-record high prices of corn have to be largely dependent upon those gasoline prices.¶ The problem with this argument, however, was revealed during the bursting of the price bubble on oil. While the price of oil fell markedly over the last quarter of 2008, n129 the price of corn, along with other food prices, remained relatively constant. n130 While to an extent it is fair to argue that some of this consistency in the price level of corn is due to the inherently inelastic demand for corn, it also shows that fluctuations in the price of corn are largely independent [\*145] from shifts in the price of oil. While not entirely dispositive on the subject, this empirical evidence would suggest that the promulgation of ethanol has had a very important role in the increased food prices. n131 Indeed, the Congressional Budget Office has recognized the connection between higher food prices and ethanol. n132¶ These changes in food prices are not limited solely to corn itself but affect all products which rely upon corn. Such products consist of both direct corn byproducts as well as products whose production is merely related to corn. One example of a corn product that has seen a rise in its price is tortillas. n133 For example, in Mexico, where tortillas are a dietary staple, prices have risen more than 60%. n134 This is an interesting linkage, as Mexico generally consumes a different type of corn than is used in ethanol, so the change in the price of tortillas results from substitution amongst different types of corn which are available in the global supply chain, thereby reflecting an interconnectedness between different agricultural products - as the price of one increases due to increased demand, the prices of its close substitutes will also increase. n135 This shows how widely the effects of a public policy on ethanol can be felt in the global economy.¶ Corn's impact on agricultural food prices is also a result of corn being one of the most common animal feeds. n136 Indeed, the Congressional Budget Office has noted this connection between ethanol and higher animal feed prices. n137 Cattle ranchers have been particularly concerned with how higher corn prices resulting from an increased subsidization of ethanol would affect demand for their [\*146] product. n138 And it's not just cattle ranchers concerned about congressional pork benefiting ethanol producers; hog farmers are also concerned by the effects of ethanol subsidies. n139 Changes in overall demand for corn, which result in an increased price, will inevitably lead to an increase in all these related agricultural markets. n140 This is exactly what we have seen in the U.S. markets over the last several years. For example, Department of Agriculture data showed that U.S. egg prices increased by 29.2% in 2007. n141 This follows a previous increase in the domestic egg market of 4.9% in 2006. n142 But the domestic market for eggs is not alone in seeing higher prices. The Labor Department reported that food prices rose by a seasonally adjusted annual rate of 5.1% in the first quarter of 2008, higher than had been reported in either of the previous three years. n143 This is a very high shift that far outpaced the rate of inflation during that period. n144¶ All this discussion of domestic subsidization of corn and ethanol must also be viewed against the backdrop of an international community that is becoming increasingly opposed to the subsidization of agriculture. U.S. corn subsidies are seen by many in the world community as distorting the worldwide price for corn and corn byproducts. n145 Many experts believe that if these subsidies were ever challenged by a WTO member nation, they would likely be held to violate WTO regulations. n146 This situation is especially galling to many in the international community because American farmers, who are generally quite [\*147] efficient in their methods, benefit from having open access to other markets. n147 As such, this subsidization may be untenable from this perspective as well.¶ In sum, ethanol has had far-reaching impacts on the American landscape, some positive, but many more less so. Increased ethanol use has resulted in less overall carbon emissions and a reduction in the emission of some airborne pollutants, when viewed as a substitute for gasoline. n148 On the other hand, increased ethanol use is linked to higher amounts of other harmful pollutants, n149 as well as to a possible increase in groundwater contamination. n150 In addition, ethanol's significant water needs exacerbate the depletion of domestic water sources. n151¶ Domestic effects, however, have not been merely environmental in nature. Ethanol, as a corn-based product, has raised the prices of food products relating to corn and resulting from the use of corn as animal feed. n152 Indeed, food prices as a whole, driven by all these ethanol-related increases, have increased markedly in the last few years, directly correlating with ethanol's increased promulgation. n153 And yet through all this, it does not seem that any vocal source has argued that this increased production of ethanol has led to a significant reduction in overall domestic crude oil consumption.¶ So while it would be untrue to say that ethanol has had no positive effects on the domestic economy, it is difficult to argue that ethanol has been a net positive in the United States. As such, it becomes of paramount importance to tweak the present situation so that ethanol's present benefits are maintained, while seeking to limit its negative consequences.

#### Corn ethanol is a dead-end technology that shouldn’t require subsidies

Wallen 10 (Zachary M. Wallen, J.D. Candidate, University of Arizona James E. Rogers College of Law, 2010, “Far From a Can of Corn: A Case for Reforming Ethanol Policy “, Arizona Law Review, Spring, 2010, LexisNexis//HZ)

The profound disconnect between the costs and benefits of corn ethanol subsidies demands a reconsideration of the usefulness of these programs. Billions spent on an annual basis in ethanol subsidies could be used for more worthwhile purposes, including those which could ultimately move America further toward energy independence. Robert Hahn did a cost-benefit analysis on the effects of ethanol subsidies and concluded that:¶ ¶ The total costs are significantly higher than the total benefits, ranging from about $ 1.5 billion ... to about $ 3 billion ... . The main costs are the direct production costs associated with the fuel changes resulting from expanded use of ethanol over oil, the excess burden associated with the government subsidies, and the negative air quality impacts, most importantly the increased nitrogen oxides emissions from ethanol use that contribute to fine particulate matter formation, which can have negative human health effects. n204¶ ¶ In dealing with ethanol subsidies, a good policy would be to require the government to undertake improved and more comprehensive cost-benefit analyses that better consider the full impact of subsidies before any new programs are implemented.¶ Ethanol is not an altogether bad technology. The problem lies in the production of ethanol from corn. Corn is simply not an energy-efficient ethanol source, and this type of ethanol has collateral effects that transcend the energy market. As a corn product, increased demand for ethanol has inevitably affected the price for corn. This has not just caused a rise in the price of corn, but it has affected the prices of all the products made with corn, such as tortillas. n205 As corn is one of the most common animal feeds, corn-based ethanol also has the effect of increasing the prices of goods, such as pork and livestock products and byproducts, which are dependent on this animal feed. n206 As food prices grow higher, the only people to benefit from this state of affairs are the ethanol lobby and agribusiness.¶ [\*155] As billions of dollars are poured annually into corn ethanol subsidies, a real opportunity is being missed. Corn ethanol is never going to be a substitute for gasoline. n207It is too expensive, too inefficient, too environmentally destructive, and requires too much land to produce. n208 It is simply a dead-end technology that is diverting governmental resources from supporting other more promising technologies.¶ The best solution to this problem is to abandon, or markedly decrease, subsidies to the corn-based ethanol industry. Given ethanol's political support, however, this would extremely difficult to accomplish without demonstrating that other alternatives to ethanol can be put into practice. Thus, the best thing that can be done is to actively support technologies that possess ethanol's benefits, but with less of its inherent limitations. These technologies include wind, solar, and nuclear power, clean coal technologies, cellulosic ethanol, and other biofuels, such as jatropha.¶ An energy-independent future will almost certainly include a combination of many of these energy sources. Corn-based ethanol, given its high level of infrastructure development, will likely play some part in this energy future. It will remain, however, a limited technology with little room for development. It is important that we actively pursue technologies that can produce an energy-independent future. We should not be tied to the Betamax of energy technologies, while neglecting far more promising ones, and we certainly should not be doing so at the cost of billions of dollars every year.

#### The Gulf of Mexico is a unique biodiversity hotspot

Leahy 7

[Stephen Leahy 2007 ENVIRONMENT: Scientists Put an Ear to the Ocean Floor, http://ipsnews.net/news.asp?idnews=36568]

Lately local fishers have reported large numbers of cod in certain areas and the data collected will show if these various populations or just the same group moving from one spot to another, he said. Two other Atlantic curtains are under negotiation, one between Florida and Cuba and another between Mexico's Yucatan Peninsula and Cuba. "The Gulf of Mexico is a marine biodiversity hotspot and we don't know why, when or how long species stay in the Gulf," Welch noted.

### Corn Bad=Food

#### Corn ethanol causes devastating economic harms worldwide

Wise 12

[Timothy A.-Director of the Research and Policy Program at the Global Development and Environment Institute, Tufts University, “Fueling the Food Crisis: The Cost to Developing Countries of US Corn Ethanol Expansion,” ActionAid International USA Report, October 2012, <http://ase.tufts.edu/gdae/Pubs/rp/ActionAid_Fueling_Food_Crisis.pdf>]

The US Farm Belt is currently experiencing the worst¶ drought it has seen in 50 years, devastating crops¶ and raising corn prices to record levels. The ongoing¶ spillover effect of this price spike is just the latest¶ episode in a devastating, protracted global food crisis¶ that has pushed millions into poverty and hunger¶ around the globe over the past 6 years. It is clear that¶ the promotion of biofuels by the US, the EU and¶ other countries has played a major role in creating the¶ food crisis. Without decisive action on the part of¶ these global actors to eliminate mandates and¶ incentives that encourage the unsustainable¶ production of industrial biofuels, the crisis will¶ continue with no end in sight.¶ The extended and widespread US drought is¶ straining corn supplies at a time of record demand.¶ Roughly 40% of US corn is now consumed in the¶ production of ethanol, a practice that has been¶ encouraged by a range of US government mandates¶ and incentives. There is no doubt that the diversion of¶ what amounts to 15% of world corn supply into fuel¶ has put significant upward pressure on food prices.¶ The National Academy of Sciences estimates that¶ global biofuels expansion accounted for 20 – 40% of¶ the price increases seen in 2007-8, when prices of¶ many food crops doubled.¶ In a previous report, “Biofueling Hunger: How US¶ Corn Ethanol Policy Drives Up Food Prices in¶ Mexico,” ActionAid expanded on recent research that¶ estimated the additional import costs to Mexico, in¶ the form of higher corn prices due to US ethanol¶ expansion, at $1.5 billion since 2004. In this report,¶ we build on new work by the same Tufts University¶ researchers to estimate the costs to import-dependent¶ developing countries in other parts of the world.¶ Using conservative estimates of ethanol and corn¶ prices, Tufts researchers estimate that from trade¶ year 2005-6 until 2010-11, US ethanol expansion¶ cost net corn importing countries $11.6 billion in¶ higher corn prices, with more than half that cost,¶ $6.6 billion, borne by developing countries.¶ Developing countries that import the majority of their¶ food are particularly vulnerable to the food crisis.¶ Many of these countries have only become heavily¶ dependent on outside sources of basic food over the¶ past 25 years. These Net Food Importing Developing¶ Countries (NFIDC) saw ethanol-related costs of $2.1¶ billion over six years. Central America experienced¶ impacts nearly as dramatic as Mexico’s on a per¶ capita basis, with $368 million in higher corn import¶ costs. Guatemala alone absorbed $91 million in¶ ethanol-related costs, in part because its import¶ dependence grew from 9% in the early 1990s to¶ nearly 40% today.

**BILLIONS of people are food insecure and high prices from CORN erode all other support mechanisms this is a multiplier for the risks of failed states, violence, and famine**   
Brown 2008

[Lester-Masters degrees in agricultural economics from the University of Maryland and in public administration from Harvard; Plan B 3.0 Mobilizing to Save Civilization; Earth Policy Institute; Chapter 2;<http://www.casavaria.com/hotspring/2008/07/173/food-insecurity-failing-states/>]

Projections by Ford Runge and Benjamin Senauer of the University of Minnesota four years ago showed the number of hungry and malnourished people decreasing to 625 million by 2025. But an update of these projections in early 2007 that took into account the effect of the massive diversion of grain to ethanol distilleries on world food prices shows the number of hungry people climbing instead of decreasing—to 1.2 billion by 2025. (77)¶ One of the manifestations of a sharp rise in grain prices is a correspondingly sharp drop in food assistance. Since the budgets of food aid agencies are set a year or more ahead, a rise in food prices shrinks food assistance. For example, the United States, by far the largest food aid donor, saw the price of a ton of food aid in 2007 climb to $611, up from $363 per ton in 2004. In the absence of supplemental appropriations, food aid will drop by 40 percent. Key recipients, like Ethiopia, Afghanistan, and the Sudan, will be hit hard. (78)¶ Working together, the FAO and WFP each year release an assessment of crop and food conditions that lists the countries in dire need of food assistance. In May 2007, a total of 33 countries with a combined population of 763 million were on this list. Of these, 17 were in need of external food assistance because of recent civil strife and conflict. Many of these countries are on the top 20 list of failing states, including Afghanistan, Burundi, Côte d’Ivoire, the Democratic Republic of the Congo, Guinea, Pakistan, Somalia, Sudan, and Zimbabwe. The bottom line is that political insecurity and food insecurity often go hand-in-hand. (79)¶ The countries on WFP’s food emergency lists are mostly societies trapped between lowered mortality and continuing high-levels of fertility. In this situation, which leads to state failure if permitted to continue indefinitely, agricultural development is often interrupted by a decline in personal security that makes it difficult to maintain technical support for farmers and to sustain timely flows of seed and fertilizer.¶ With failing states and declining personal security, it is difficult even to operate food relief programs. WFP head James Morris, discussing the food relief operation in early 2007 in Sudan’s Darfur region, where violence and insecurity are rampant, says, “Our convoys are attacked almost daily. We had a driver killed there at the end of last year. Our convoys coming through Chad from Libya are always at risk.” In failed and failing states, food relief, however sorely needed, is not always assured. And sometimes even though people are starving, it is simply not possible to reach them with food. (80)¶ There are many threats to future food security, including falling water tables and rising temperatures, but the most immediate threat may be the diversion of an ever-larger share of the U.S. grain harvest into the production of fuel for cars. Only the U.S. government can intervene to restrict this diversion and avoid life-threatening rises in world grain prices.

#### US corn market sets world food prices for –various products

Wise 12

[Timothy A.-Director of the Research and Policy Program at the Global Development and Environment Institute, Tufts University, “Fueling the Food Crisis: The Cost to Developing Countries of US Corn Ethanol Expansion,” ActionAid International USA Report, October 2012, <http://ase.tufts.edu/gdae/Pubs/rp/ActionAid_Fueling_Food_Crisis.pdf>]

The debate over the effect of biofuels on food prices¶ has intensified in the context of the food crisis, and¶ the diversion of a large and increasing share of US¶ corn to ethanol production has drawn particular¶ attention. Deservedly so, since corn is one of the key¶ staple food crops in the world and the primary source¶ of calories and nutrients for nearly 1 billion people¶ worldwide. Corn is also one of the most widely used¶ feed crops for animals, so its availability and price¶ have direct impacts on the price of dairy products,¶ eggs, and meat. The United States is at once the¶ world’s largest producer and exporter of corn, so¶ changes in US corn supply and use quickly affect¶ prices worldwide.

#### Corn-based ethanol bad- drives up food prices and contributes to emissions

**Scott Faber 2/4/2013** (Scott Faber: Vice President of Government Affairs at the Environmental working group. Environmental Working Group: "Corn Ethanol: Bad for Farmers, Consumers and the Environment.” Working Group is the nation’s leading environmental health research and advocacy organization. <http://www.ewg.org/agmag/2013/02/corn-ethanol-bad-farmers-consumers-and-environment>.)

**By driving up the price of food and gas and causing costly engine damage, corn ethanol has been bad news for consumers. And by driving up the price of food, corn ethanol is also costing all of us money – by increasing the cost of federal programs like food stamps and school lunches. But corn ethanol has not just been a disaster for consumers, most farmers, and taxpayers; it’s also been a disaster for the environment** – worse, in fact, than Canadian tar sands. That’s according to the Swiss Federal Laboratories, which concluded that **biofuels “often shift environmental burdens toward land-use related impacts.” By dramatically raising the price of corn**, the federal corn ethanol mandate has, **in just the last four years, contributed to the conversion of 23 million acres from wetland and grassland** – an area the size of Indiana – **to cropland. In fact, thanks to the corn ethanol mandate, we have lost more than wetlands and grasslands in the last four years than in the previous** 40. By encouraging farmers to plow up wetlands and grasslands, **the mandate is causing more carbon to be released into the atmosphere, consuming more water to irrigate crops, causing more fertilizer to wash off farm fields and destroying more habitat that supports wildlife – and millions of jobs. What’s more, burning corn ethanol in gasoline releases more benzene, a known carcinogen, and other toxic air pollutants that have been linked to asthma, bronchitis and other respiratory ailments.** Thanks to new fuel efficiency standards, the rationale for the corn ethanol mandate created in 2005, and expanded in 2007, has evaporated. So why is Congress continuing to force consumers to use a fuel that increases food and gas prices and is bad for the environment and public health? **Now is the time to reduce the use of corn ethanol in our gasoline.**

# Solvency Ext

### U.S. Corn Ethanol-Crowd Out

#### Plan crowds out U.S. domestic corn ethanol production

Specht 13

[Jonathan-J.D. Wash. U St. Louis, Legal Advisor, “Raising Cane: Cuban Sugarcane Ethanol’s Economic and Environmental Effects on the United States,” Environmental Law & Policy Journal, Univ. of California Davis, Vol. 36:2, <http://environs.law.ucdavis.edu/issues/36/2/specht.pdf>]

V. Economic Effects of Cuban Sugarcane-Based Ethanol¶ ¶ This seemingly easy recommendation is, however, complicated by an evaluation of the economic effects that would likely result from its implementation. The economic and, thus, political interests of the Midwestern states will likely try to keep demand for imported ethanol from growing, but the seeds of U.S. demand for such ethanol may have already been planted by the [\*192] RFS. The Energy Independence and Security Act of 2007, while providing a big boost to the corn-based ethanol industry, also tried to ensure that U.S. biofuel production moves away from near exclusive reliance on corn by requiring 21 billion gallons of total annual U.S. ethanol production come from sources other than cornstarch by 2022. n126 For both scientific and economic reasons, however, American efforts to transition domestic ethanol production away from near-complete dependence on corn have so far fallen short. n127 As a 2008 USDA report acknowledges, "Corn will continue to be the primary feedstock for the biorefinery platform for the next 10 to 20 years." n128¶ The RFS called for production of 6.5 million gallons of cellulosic ethanol in 2010 (lowered from an earlier target of 100 million gallons). n129 That target was not met, and no cellulosic ethanol was blended into gasoline in the second half of that year. n130 Cellulosic ethanol production has slowly begun to develop in the United States, with the first commercial-scale cellulosic ethanol plant under construction as of the end of 2012 and scheduled to begin operations in 2013. n131 However, the further growth of cellulosic ethanol production may be slowed by political developments in the United States. n132 The first commercial refinery of this type was made possible by a $ 105 million federal loan guarantee from the Department of Energy. n133 Despite President Obama's re-election, his administration may be reluctant to make further such guarantees in the wake of the Solyndra scandal n134 and greater scrutiny of Department of Energy actions by Republicans in the House of Representatives. n135¶ [\*193] Imported ethanol from non-corn sources may be an increasingly popular means of reducing U.S. fossil fuel dependence for two reasons in particular. First, the transition from corn-based to cellulosic ethanol is difficult. Second, the RFS caps the amount of ethanol from corn that can be blended into U.S. fuel at 15 billion gallons per year by 2022. n136 In coming years the amount of ethanol imported into the United States is likely to increase by a significant amount unless Congress revives the ethanol tariff. If both U.S. ethanol import restrictions and the ethanol blending tax credit were eliminated (as happened at the end of 2011), imports of ethanol into the United States would more than double. n137¶ Unless Congress raises the RFS by a sufficient degree to absorb all domestic ethanol production on top of these new imports, the increase in such imports would likely damage the domestic ethanol industry. "Whatever the level or type of biofuel, increased imports (holding other factors constant) would reduce the quantity of domestically produced biofuels, which would reduce the demand for biofuel feedstocks." n138 Because very little ethanol is currently imported into the United States, law and policy changes that successfully fostered the development of a Cuban sugarcane-based ethanol industry would have a significant economic impact on the United States. Such a change would have the largest economic effect on two regions: the Midwest, which is currently the primary source of ethanol production in the United States, and the Southeast, especially Florida. This Part of the Article will discuss the likely economic effects of such policy changes first on the Midwest, then on Florida, then on the United States generally.

### Industry Growth-Fast

#### Global market is ripe for new major ethanol exporters, the demand is high, and Cuba is in perfect position

Alonso-Pippo et al. 8

[Walfrido Alonso-Pippo- former Vice-President of the Solar Energy Department at the University of Havana and a former member of the Cuban National Renewable Energies Front, where he was a specialist in biomass energy use, Carlos A. Luengo, John Koehlinger, Pierto Garzone, Giacinto Cornacchia, “Sugarcane energy use: The Cuban case,” Energy Policy, Vol. 36, Issue 6, June 2008, <http://www.sciencedirect.com/science/article/pii/S0301421508000840>]

High oil prices appear here to stay. Only to a small degree do oil prices above 60 USD a barrel reflect near-term fears of a conflict with Iran or more widespread instability in the Middle East. The fundamental factor sustaining high oil prices is rising energy demand stemming from global economic growth, especially demand from China, India, the Middle East and other emerging economies. On the supply side, increased energy reserves have not kept pace with demand. And even as oil prices approaching, as of this writing 95 USD a barrel, spur a new exploration, there is a consensus that new reserves, many located offshore or in political hotspots, will be more expensive to exploit. Equipment and labor bottlenecks in the oil services sector further support the belief that the supply-side costs of new energy exploration are rising along with demand. In short, global economic growth appears to have effected a structural change in the pricing of energy, with the price floor having risen dramatically in recent years. Sustained high oil prices present an opportunity and incentive to develop alternative energy sources, including ethanol fuels and sugarcane biomass energy by-products. Not surprisingly, the ethanol fuel market has experienced a spectacular six-fold growth in the last decade, while electricity cogeneration in the sugar agro-industry has also seen a continuous upswing during the same period.¶ At the World Bank (WB) Seminar on Energy & Bio-fuels on April 25, 2006, in Washington DC, several specialists predicted that the price of sugar in the world market will rise before stabilizing at around 250 USD/ton, at least until 2011 ([Bloomberg, 2007](http://www.sciencedirect.com/science/article/pii/S0301421508000840#bib7)) ([Fig. 8](http://www.sciencedirect.com/science/article/pii/S0301421508000840#fig8)).¶ There is undoubtedly an increasing interest in ethanol fuel in the US, EU, Japan and many other countries around the world, first because of the rise in oil prices and second because of the environmental concerns embodied in the Kyoto Protocol. Ethanol basically is produced from corn and sugarcane. That said, the current conditions under which ethanol is produced from corn in the US are unsustainable from both a cost and an environmental point of view, given the levels of natural gas that must be burnt during the production process. The production cost of ethanol produced from corn in USA is twice as expensive as the ethanol produced from sugarcane in Brazil. Nonetheless, US farm subsidies and import tariffs continue to encourage corn-based ethanol production over the development of sugar-based ethanol. As a result of import duties on imported sugar, US sugar prices are twice the world market price. And US-produced corn ethanol is further protected by steep tariffs on the import of sugar-based ethanol from Brazil.¶ Brazil began sugarcane-based ethanol fuel production on a large commercial scale in the early 1970s, making it the country with the most experience in this field. The commercial introduction of flex fuel car technology in Brazil's automotive market was a decisive step toward the widespread global use of ethanol as fuel. However, further steps must occur before ethanol is used as vehicle fuel on a global basis. For one, Brazilian ethanol exports are currently limited by absence of a mature world ethanol market. Currently, ethanol is not among the commodities listed on the New York Board of Trade (NYBOT) because there are not enough ethanol-producing countries aside from Brazil to provide alternative supplies to the market. Also, despite the important role ethanol plays in Brazil's domestic energy market, other countries are not yet importing Brazilian ethanol on a large scale, relying still on Middle Eastern, Russian, Central Asian, Venezuelan and African oil imports for most of their energy needs.¶ Some efforts to diversify ethanol production beyond Brazil have focused on Africa. It is hoped by some in Europe that ethanol production may invigorate the depressed agricultural sectors in these African countries and in doing so stem the tide of illegal immigration to Europe. Some agreements for the transfer of Brazilian technology for ethanol production to African countries are being negotiated. However, except for South Africa, no African countries have experience producing ethanol from sugar. Moreover, these African countries lack skilled labor needed to carry out the Brazilian model. In Oceania, Australia is the one country with a well-developed sugar industry, but wages in the agricultural sector there are too high for ethanol production to be cost-effective.¶ While some Asian countries have good sugar production experience, high sugar prices in the world market (the international price of sugar spiked in February 2006 to 415 USD/ton of sugar) do not stimulate investment in ethanol production. In any case, virtually all Asian ethanol production expansion will be used for domestic energy needs, especially in China and Japan. In India, a sugar–ethanol-producing country, recent regulations governing the use of gasoline–ethanol blends will create a domestic demand for ethanol that should also absorb domestic ethanol supplies.¶ Compared to other regions, Latin America—particularly Central America and the Caribbean, historical sugar-producing economies where the sugar–ethanol infrastructure already has a foundation, labor costs are low, and the political conditions are more or less stable—offers the best near-term potential for large-scale sugarcane ethanol production.¶ This is a market opportunity which Cuba, with the longest experience of sugar–ethanol and sugarcane derivates production in the region, is positioned to take advantage of.

#### Plan leads to Cuba producing 2 billion gallons of sugar ethanol per year

Soligo and Jaffe 8

[Ronald Soligo-Scholar at James Baker Institute for Public Policy, Rice Univ., Amy Jaffe-Wallace S. Wilson Fellow in Energy Studies, James A Baker III Institute for Public Policy, Rice Univ., “Energy Balances and the Potential for Biofuels in Cuba,” Cuba’s Energy Future, 2010, kindle]

In 2002 we published a paper on Cuban energy that began with the observation “Cuba is considered a promising growth energy market in the Americas.” 1 Eight years later Cuba shows even greater promise in the energy sector, but progress in realizing energy opportunities has been slow. Gaining a better understanding of Cuba's energy potential is important for policymakers in the United States, Cuba, and the Caribbean region. From the American point of view, the possibility of having an additional supplier of energy to the U.S. market located just a few miles offshore could contribute significantly to the United States' energy security. The magnitude of Cuba's energy resources is uncertain, but one estimate, by the U.S. Geological Survey, is that Cuba has mean “undiscovered” reserves of 4.6 billion barrels of conventional oil and 9.8 trillion cubic feet of natural gas in the North Cuba Basin. 2 In addition, Cuba has large land areas that once produced sugar but now lie idle. These could be revived to provide a basis for a world-class ethanol industry. We estimate that if Cuba achieves the yield levels attained in Nicaragua and Brazil and the area planted with sugarcane approaches levels seen in the 1970s and 1980s, Cuba could produce up to 2 billion gallons of sugar-based ethanol per year. Despite this potential, Cuba remains dependent on energy imports on a concessional basis. The collapse of its economy when assistance from the Soviet Union was terminated by that country's breakup demonstrated in a dramatic way the benefits that could accrue if Cuba became energy self-sufficient. Cuba has been thwarted by U.S. economic sanctions and other internal domestic barriers in aggressively pursuing its own energy independence. For the time being, Havana has adopted a policy of replacing former Soviet energy assistance with current Venezuelan aid. This is a risky strategy, since Venezuelan beneficence is dependent on Caracas's own economic health, which is currently shaky. 3 In this chapter we argue that given its rich potential in both conventional energy and biofuels, Cuba can be both energy-independent and an energy exporter.

#### Cuba will become a global ethanol force—conditions are ripe

Berg & Rademakers, 08

[Jonas Van Den Berg-consultant in the energy sector, Laurens Rademakers-anthropologist

“Biofuels could transform Cuba into a prosperous nation,” Feb. 20,

http://news.mongabay.com/bioenergy/2008/02/biofuels-could-transform-cuba-into.html]

Cuba once was the world's largest sugar exporter, but since the collapse of the Soviet Union its output declined dramatically. Today, the island state is a shadow of its former self. Even though the emerging ethanol market holds major potential for the revival of Cuba's economy, Fidel Castro has spoken out against the fuel, claiming it endangers food security. This was mainly a rhetorical exercise, aimed at slamming the United States, because despite the criticism, Cuba has been quietly investing in its own ethanol infrastructure, striking deals with Venezuela and Nigeria.¶ With Castro gone and his brother Raul taking over, Cuba could become a major player on the world biofuels scene and reap major social, economic and environmental benefits in the process. Raul Castro is said to be a pragmatist, and a fan of biofuels. The sector could offer an excellent opportunity for the country to transform its economy gradually into a more open, market-oriented system.¶ The new ethanol industry is the most obvious low hanging fruit for Cuba's leaders to revive the island's economy. Analyses show the country has the capacity to produce between 2 and 3.2. billion gallons of exportable ethanol from existing plantations. This figure puts Cuba into the big league, placing it right behind the U.S. and Brazil as the third largest producer.¶ Given that sugarcane yields highly competitive biofuels that needn't be subsidised, tapping this potential would bring in major economic returns. What is more, the sector would also bring a reliable and renewable supply of electricity to the country's population. As is done in Brazil, ethanol factories utilize bagasse - the residue from cane pressing - to cogenerate heat and power, excess electricity being fed into the grid. Biofuels could thus bring a huge number of jobs, foreign currency, and energy to Cuba.¶

#### Cuba can provide over 3 billion gallons of ethanol with new technologies

Forman 08

(July 31st 2008, Dr. Johanna Mendelson Forman- Senior Associate, Americas Program, Center of Strategic International Studies, “Energy in the Americas”, House Committee on Foreign Affairs, Subcommittee on the Western Hemisphere http://democrats.foreignaffairs.house.gov/110/men073108.pdf)

Brazil’s success story has generated considerable interest in biofuels across Latin America, but no other industry in the region has yet approached the size or sophistication of Brazil’s. Brazil is now actively conducting ethanol diplomacy with neighbor countries, signing technology exchange agreements with Peru,¶ Colombia, Argentina, Venezuela, Panama and Cuba. Benefiting from fast improving relations, President Lula da Silva signed in mid-January 2008 several agreements with President Raul Castro to bolster economic ties, focusing in several areas, including the sugar industry8. In exchange for know-how, the Brazilians are obtaining a significant strategic advantage in the development of a sugar-based biofuels industry on the doorstep of the U.S. Agricultural experts have estimated that Cuba could eventually provide more than 3 billion gallons of sugar-based ethanol annually; perhaps even more when new technologies for extracting energy from sugar cane waste come online - placing the island third in world ethanol production, behind the U.S. and Brazil. Given the relatively small demand for auto fuel in Cuba, nearly all of that ethanol would be available for export9.¶ Many countries in Latin America have ample farmland available for cultivation of energy crops. The Caribbean and Central America, but especially the Dominican Republic, Cuba, Guatemala, Costa Rica, and El Salvador, which once relied on sugar exports to support their economies, are now ripe for conversion of that commodity to ethanol. Given the absence of fossil fuels in this part of the hemisphere the advent of biofuels offers these countries a much needed alternative source of fuel for domestic consumption and, in some cases, a source of export revenues. Under the Caribbean Basin Initiative (CBI), countries in Central America and the Caribbean have had duty-free access to the United States since 1989 for ethanol produced from regional feedstock. Access for ethanol derived from non-regional feedstock has been limited by a CBI quota equal to 7 percent of total U.S. ethanol consumption. Above that 7 percent quota, another 35 million gallons of Caribbean ethanol can come into the U.S. duty-free if it has 30 percent local sugarcane content. Beyond the additional 35 million gallons, it is duty-free only with 50 percent local feedstock.¶

### Cuba has expertise

#### Cuba key to sugarcane- environment and skilled workers\*\*

**Patiño 2009** (Christian Santiago Patiño: awarded Second Prize in the ASCE 2009 Student Prize Competition for undergraduate students. ASC college of engineering Bangalore. ASCE: “THE CUBAN SUGAR DILEMMA:

THE PROSPECT FOR A GREEN FUTURE” < <http://www.ascecuba.org/publications/proceedings/volume19/pdfs/patino.pdf>>)

The intention of this work is to assess whether Cuba can become an important ethanol producer. With this in mind, the first section will examine the conditions for why Cuba might potentially become an important ethanol producer. The second section will provide an in depth description on the evolution of the Cuban sugarcane sector. And the third section will appraise the present and future world demand for ethanol. THE NECESSARY CONDITIONS: LOCATION, LABOR FORCE, TRANSPORTATION, AND SUGARCANE **This section sets out to provide a brief explanation on the conditions that favor ethanol production in Cuba.** The emphasis of this section will be on Cuba’s ability to grow and transport sugarcane. Soil, Temperature, Humidity, and Latitude According to Agronomic Engineer, Guilherme Rossi Machado Jr., **the growth of sugarcane is contingent on four basic requirements: soil, temperature, rain fall, and latitude** (Machado 210). This sub-section will briefly analyze how **each requirement applies to Cuba**. Soil: Sustainable sugarcane production takes place in soils that are well-drained. With this in mind, since 1997 the **Cuban government has concentrated sugarcane production around the provinces** **of Matanzas, La Habana, Villa Clara, and Cienfuegos. The red soil in these provinces is considered to have excellent drainage and acceptable fertility** (see Figure 1). Temperature: **Temperatures ranging between 16°C and 38°C are the most suitable for sugarcane cultivation.** Furthermore, **sucrose accumulation levels are higher where the difference in temperature between day and night is high—ideally 10°C** (Machado 210). **Cuba fits both prerequisites impeccably**. Not only is the average temperature 26°C, but the average temperature difference between day and night is 10°C (Cubaweather.org, 2009). Humidity: **It is estimated that 70 percent relative humidity is the perfect level for sugarcane cultivation,** yet lower humidity levels during the dry season are believed to assist the ripening process (Machado 211). **Cuba meets both conditions**. The relative humidity level of the island during the wet season is 75 percent and 60 percent during the dry season (Machado 211). Latitude: **Sugarcane produces its highest content of sucrose at latitudes 18° North and 18° South. The island of Cuba lies just above this mark**, between 19° and 23 ° N (Machado 211). Labor **It has been shown above that Cuba possesses the ideal land and climate for the production of sugarcane. These conditions are complemented by Cuba’s readily available and highly experienced labor force.** Estimates suggest that before the area under sugarcane cultivation was downsized there were 460,000 workers directly employed by the sugar agroindustry sector (Pérez-López 298). The vast majority of these workers were unprofessional laborers that could be easily shifted back to the harvesting of sugarcane for ethanol factories. But, it is also important to point out that **Cuba also possesses many highly skilled workers and researchers that could run and oversee Cuba’s prospective ethanol sector. The fact that sugarcane has historically been the island’s main crop significantly favors ethanol production in Cuba.** Transportation/Infrastructure: Highways and Ports Cuba’s prospective ethanol sector would also benefit greatly from Cuba’s expanding infrastructural projects. Between 1990 and 2001 alone, the Cuban government expanded the island’s highway network from 245,000 kilometers to 609,000 kilometers (ECLACSTAT, 2009). Figure 2 presents the growing highway network, yet, it is important to point out that there are smaller roads not seen in this map that branch out of the highway and into the sugarcane fields.

#### Cuba contains the most skilled sugarcane farmers

**Curry-Machado 2011** (Jonathan Curry-Machado: Member of the Agrarian Development group at Wageningen University, in the Netherlands. Macmillan: “the Cuban sugar industry” <http://us.macmillan.com/cubansugarindustry/JonathanCurryMachado>.)

Technological innovation was central to nineteenth-century Cuba’s lead in world sugar manufacture. Along with steam-powered machinery came migrant engineers, indispensable aliens who were well rewarded for their efforts. These migrant engineers remained perennial outsiders, symbolic of Cuba's growing economic dependency, privileged scapegoats unconsciously caught up in the island's political insecurities. This book tells the story of a group of forgotten migrant workers who anonymously contributed to **Cuba's development and whose experience helps illuminate both the advance of the Cuban sugar industry and the processes by which the island was bound into global commodity-driven networks of control, dependency, and resistance.** Praise “**History at its best--crafted to link commodity and migration history, documenting networks of merchants, manufacturers, and skilled workers and how their mobility and knowledge transfer catapulted nineteenth-century Cuba to the pinnacle of global sugar production and trade**, regaling us with a window onto the forgotten lives of itinerant maquinistas following the routes of British steam-driven technology, a world in which they enjoyed the privileges of a foreign white enclave in a slave plantation economy yet were also social outsiders, both catalysts and scapegoats when the contradictions of Spanish colonial slave society in an epoch of British abolitionism, erupted in the 1844 Ladder Conspiracy. A veritable tour de force in global labour history.”--Jean Stubbs, Institute for the Study of the Americas, University of London “Jonathan Curry-Machado's social history of the engineers and mechanics that immigrated from northern Europe and North America to Cuba during **the first half of the nineteenth century provides an original perspective on the industrialization of world cane sugar production and Cuba's pioneering position in it.** Curry-Machado carefully reconstructs the role of these foreign technicians in the transformation of the Cuban sugar industry, and effectively situates their experience within the tensions deriving from the relations between global networks and local conditions, technological change in a slave economy, and foreign identity in a colonial society. This book will be of interest to specialists and general readers alike.”--Dale Tomich, Binghamton University

#### Cuba is historically impeccable at sugarcane production

**Elledge 2009** (Nicholas Elledge: Research associate at COHA. Council on Hemispheric Affairs: "Cuba's Sugarcane Ethanol Potential: Cuba, Raul Castro, and the Return of King Sugar to the Island."  <http://www.coha.org/cubas-sugarcane-ethanol-potential/>.)

As the result of a precipitous contraction in the Cuban economy, Cubans have recently experienced crippling energy cutbacks and other shortfalls that are reminiscent of the devastating hardships of the “Special Period,” and industries have continued to falter due to the evaporation of credit and investment flows which largely dried up after the break-up of the Soviet empire. In the first half of 2009, the Obama Administration launched a series of modest initiatives aimed at normalizing U.S.-Cuba relations, most recently exemplified by the loosening of restrictions on travel by Cuba-Americans, lifting controls on remittances, and giving the nod to U.S. telecommunication investments on the island. Though President Obama recently renewed the Trading With the Enemy Act, policy mitigations have prompted speculation that a greater volume of trade and investment is likely to be permitted in the future. These factors, coupled with the current 28-year high in sugar prices and the delicate health of Fidel Castro, lead to the question: would Cuba benefit from, and does it possess the technological and infrastructural means and political will to expand and modernize its sugar and sugarcane ethanol industries to take advantage of the unique developments now taking place around the globe? Based on the following assessment, despite the precipitous collapse of Cuba’s sugar industry beginning in the early 1990s, **the country’s economy would benefit from opening its markets to foreign investment and revitalizing its tattered sugar industry for the production of raw sugar, ethanol and electricity.** A Glorious Past and a Conflicted Present **Sugar has served as one of the most important formative influences on Cuba’s socioeconomic development; as according to the Cuban adage, “without sugar, there is no country.”** Ever since Columbus introduced sugarcane to Cuba on his second voyage, **it has been referred to as “the grass of Cuba,” and the island has been one of the leading producers and exporters of sugar since the 1600s. Even the implementation of Cuba’s railway system in the 1830’s was directly linked to sugarcane planting and cultivation.** In the first half of the 20th century, while sugarcane agriculture was spurred by U.S. financial speculation and investment cycles, the industry was all but ruined by a drought of incoming funds brought on by the Great Depression. Later, it was devastated by the U.S.-Cuban embargo, which was in part targeted at undercutting Cuba’s sugar industry. Sugar cultivation had been heavily fostered by Soviet patronage and the Council for Mutual Economic Assistance (CMEA) trade bloc, producing an impressive zafra (sugarcane harvest) of 8.5 million tons in 1970. Throughout the 1980s, production was sustained at an annual average of 7.5 million tons with sugar accounting for three quarters of Cuba’s foreign exchange earnings, until the collapse of the Soviet Union led to a devastating 35 percent contraction in the Cuban economy from 1991-1993. Cuba’s sugarcane production sharply declined thereafter, from 8.4 million tons in 1990 to 4.2 million only three years later. A blatant lack of efficiency, a series of droughts and hurricanes, as well as an economic crisis led to a fall in average annual production to a mere 3.7 million tons from 1994 to 2003. In 2002 the Castro government, in despair, severely downsized the industry, closing over half of Cuba’s 156 sugar mills in what was called the “Alvaro Reynoso Task.” As a result, production continued to shrink. By 2007-08, the Cuban zafra amounted to a mere 1.5 million tons. Since 2003, in order to fulfill export contracts as well as meet domestic consumption levels estimated at 700,000 tons/year, Cuba unbelievably has had to become a net importer of sugar. Despite its clear deterioration in recent years**, a revived Cuban sugar industry could serve an important role in the immediate future by attracting a new tranche of foreign investment** while bolstering the country’s failing economy **through the production of raw sugar, which would be processed into renewable fuel as well as cogenerate electricity. In fact, Cuba has produced ethanol in the past**; when imported oil supplies were drastically curbed during the WWII conflict, Cuba produced roughly 26 million gallons of anhydrous ethanol to blend with gasoline. This practice, however, was discontinued after the war in order to meet U.S. raw sugar import quotas. Today, Juan Tomás Sanchez of the Association for the Study of the Cuban Economy estimates that Cuba eventually could supply up to 3.2 billion gallons of ethanol annually. A more modest prediction by Cuba expert Jorge Hernandez Fonseca projects a production figure around 2 billion gallons per year, which would still make the island the third largest sugar producer in the world, behind the U.S. and Brazil. Regardless, Rivera Ortiz, director of the Cuban business society ZERUS, told business magazine Opciones in 2006 that, “any efforts by foreign and Cuban entrepreneurs to jointly produce ethanol in Cuba must first look at guaranteeing financial and technological resources needed to boost sugarcane production as the necessary raw material for the advancement of ethanol projects.”

#### Cuba has land and is successful in agriculture

**Altieri and Funes-Monzote 2012** (Altieri: Professor of Agroecology at the University of California, Berkeley. Monthly Review: "The Paradox of Cuban Agriculture."  <http://monthlyreview.org/2012/01/01/the-paradox-of-cuban-agriculture>.)

But perhaps the most important changes that led to the recovery of food sovereignty in Cuba occurred in the peasant sector which in 2006, controlling only 25 percent of the agricultural land, produced over 65 percent of the country’s food.5 Most peasants belong to the ANAP and almost all of them belong to cooperatives. The production of vegetables typically produced by peasants fell drastically between 1988 to 1994, but by 2007 had rebounded to well over 1988 levels (see Table 1). This production increase came despite using 72 percent fewer agricultural chemicals in 2007 than in 1988. Similar patterns can be seen for other peasant crops like beans, roots, and tubers. **Cuba’s achievements in urban agriculture are truly remarkable—there are 383,000 urban farms, covering 50,000 hectares of otherwise unused land** and producing more than 1.5 million tons of vegetables with top urban farms reaching a yield of 20 kg/m2 per year of edible plant material using no synthetic chemicals—equivalent to a hundred tons per hectare. Urban farms supply 70 percent or more of all the fresh vegetables consumed in cities such as Havana and Villa Clara. **All over the world, and especially in Latin America, the island’s agroecological production levels and the associated research efforts along with innovative farmer organizational schemes have been observed with great interest.** No other country in the world has achieved this level of success **with a form of agriculture that uses the ecological services of biodiversity and reduces food miles, energy use, and effectively closes local production and consumption cycles.** However, some people talk about the “Cuban agriculture paradox”: if agroecological advances in the country are so great, why does Cuba still import substantial amounts of food? If effective biological control methods are widely available and used, why is the government releasing transgenic plants such as Bt crops that produce their own pesticide using genes derived from bacteria? An article written by Dennis Avery from the Center for Global Food Issues at the Hudson Institute, “Cubans Starve on Diet of Lies,” helped fuel the debate around the paradox. He stated: The Cubans told the world they had heroically learned to feed themselves without fuel or farm chemicals after their Soviet subsidies collapsed in the early 1990s. They bragged about their “peasant cooperatives,” their biopesticides and organic fertilizers. They heralded their earthworm culture and the predator wasps they unleashed on destructive caterpillars. They boasted about the heroic ox teams they had trained to replace tractors. Organic activists all over the world swooned. Now, a senior Ministry of Agriculture official has admitted in the Cuban press that 84 percent of Cuba’s current food consumption is imported, according to our agricultural attaché in Havana. The organic success was all a lie.6 Avery has used this misinformation to promote a campaign discrediting authors who studied and informed about the heroic achievements of Cuban people in the agricultural field: he has accused these scientists of being communist liars. The Truth About Food Imports in Cuba Avery referred to statements of Magalys Calvo, then Vice Minister of the Economy and Planning Ministry, who said in February 2007 that 84 percent of items “in the basic food basket” at that time were imported. However, these percentages represent only the food that is distributed through regulated government channels by means of a ration card. Overall data show that Cuba’s food import dependency has been dropping for decades, despite brief upturns due to natural and human-made disasters. The best time series available on Cuban food import dependency (see Chart 1) shows that it actually declined between 1980 and 1997, aside from a spike in the early 1990s, when trade relations with the former Socialist Bloc collapsed.7 However, Chart 2 indicates a much more nuanced view of Cuba’s agricultural strengths and weaknesses after more than a decade of technological bias toward ecological farming techniques. **Great successes have clearly been achieved in** root crops (a staple of the Cuban diet), **sugar and other sweeteners**, vegetables, fruits, eggs, and seafood. Meat is an intermediate case, while large amounts of cooking oil, cereals, and legumes (principally rice and wheat for human consumption, and corn and soybeans for livestock) continue to be imported. The same is true for powdered milk, which does not appear on the graph. Total import dependency, however, is a mere 16 percent—ironically the exact inverse of the 84 percent figure cited by Avery. It is also important to mention that twenty-three other countries in the Latin American-Caribbean region are also net food importers.8

#### Cuba has the sugar R&D to generate large amounts of electricity from cogeneration

Alonso-Pippo et al. 8

[Walfrido Alonso-Pippo- former Vice-President of the Solar Energy Department at the University of Havana and a former member of the Cuban National Renewable Energies Front, where he was a specialist in biomass energy use, Carlos A. Luengo, John Koehlinger, Pierto Garzone, Giacinto Cornacchia, “Sugarcane energy use: The Cuban case,” Energy Policy, Vol. 36, Issue 6, June 2008, <http://www.sciencedirect.com/science/article/pii/S0301421508000840>]

Among the 70 active sugar mills in Cuba, there are 45 with a daily milling capacity of between 4600 and 14,000 ton of cane/day. If these mills’ energy systems were modernized, their cogeneration capacity could be increased from 600 MW to at least 1400–1600 MW. This would represent a more than 50% increase of the NEES's total installed power capacity in 2005 of 2940 MW ([CEPAL, 2006a](http://www.sciencedirect.com/science/article/pii/S0301421508000840#bib9)).

There are several research institutions associated with the sugarcane industry and industry–university cooperation is very close. The most important among them is the Institute for Sugar Investigation (ICINAZ), which has developed more than 13 new technologies; and the Cuban Research Institute of Sugarcane Derivates (ICIDCA), which has patented several sugarcane derivates technologies. The Sugar Industry Thermal Engineering Research Center at the Central University of Las Villas has annexed a pilot sugar mill. The Center for the Study of Renewable Energy Technologies at the Jose A. Echevarría Superior Institute of Technology (ISPJAE) is involved in laboratory-scale sugarcane biomass pyrolysis and gasification. Whatever mismanagement of the Cuban sugar industry has taken place, this research infrastructure suggests that Cuba does possess the requisite specialists and technological know-how to modernize the industry to develop its bioenergy production potential.

### Direct Investment Solvency

#### Direct foreign investment if essential to grow Cuban sugar ethanol

ELLEDGE 09

(OCTOBER 29, 2009, Nicholas Elledge Council on Hemispheric Affairs, “Cuba’s Sugarcane Ethanol Potential: Cuba, Raul Castro, and the Return of King Sugar to the Island”, http://www.coha.org/cubas-sugarcane-ethanol-potential/#sthash.JIuzwF7o.dpuf)

It must be noted that Cuba’s ethanol and sugar production capacity will increase exponentially if direct foreign investment, which has been seen only sparingly up to now, is encouraged to enter by direct government policy. Starved by a recurrent shortage of hard currency, new capital inputs needed to modernize Cuban sugar mills would have to come from abroad. To rectify this current shortage, Walfrido Alonso-Pippo, who has been a member of the University of Havana, suggests an investment strategy similar to that used to fuel a Cuban natural gas power plant. He maintains that this “joint venture agreement for a recently constructed natural gas power plant could serve as a model for modernization of [Cuba’s] sugar bioenergy infrastructure. Under this existing arrangement, the foreign partner owns a third of the plant’s output, participates in its management, and receives a proportion of the plant’s profits.” Dr. Alonso-Pippo goes on to note that legal, institutional and political barriers to investment in Cuba have tended to remain a major obstacle, though recent heavy foreign investments in Brazil’s sugar ethanol production facilities suggest the feasibility of similar investments in Cuba.¶ Another scenario under which Cuba could accelerate investment was offered by Stanford economist Paul Romer who has suggested starting a free trade zone in Guantanamo Bay in the southeastern part of Cuba, where the U.S. currently administers an area roughly twice the size of Manhattan. Comparable to the Chinese model of Communist rule and the design of free trade zones in the communist east, such a zone in Cuba’s eastern region, where the majority of the island’s sugarcane is grown, might be a catalyst for modernization, trade opportunities, investment, and integration. Under either Dr. Alonso-Pippo or Dr. Romer’s plans, Cuba would be a strong contender to receive the foreign investment necessary for a thriving economy without the political ramifications of foreign ownership and ideological clashes. As Washington looks to improve relations with the Caribbean nation, the bulk of the responsibility for the lobbying effort will likely fall on the shoulders of both sides of the Cuban population. This will hopefully encourage fair-trade and investment practices based on sugarcane-based ethanol while respecting Cuba’s national sovereignty. The case for U.S. involvement in sugarcane cultivation is straightforward: sugarcane ethanol is exponentially more energy efficient, cheaper, and cleaner than corn-based ethanol. The withholding of trade with Cuba based on the premise of “political prisoners” seems grossly opportunistic if not hypocritical as the U.S. engaged in over $66 billion in bilateral trade with Saudi Arabia last year. All told, the lure of ethanol may make this irresistible.

#### Lack of direct foreign investment in Cuba remains an obstacle to developing sugarcane ethanol

Elledge 12 (Nicholas Elledge, COHA research fellow, “Cuba’s Sugarcane Ethanol Potential: the Return of King Sugar”, MercoPress, an independent news agency which focuses on delivering news related to Mercosur-member countries, covering an area of influence which includes the South Atlantic and insular territories, 10/30/09, http://en.mercopress.com/2009/10/30/cubas-sugarcane-ethanol-potential-the-return-of-king-sugar//HZ)

Cuba’s sugar industry has suffered from long-term neglect and insufficient investment, and its productive role has been utilized more as a vehicle for short term profit than as an engine for long term economic growth. From 1959 to 1999, only six new sugarcane mills with the capacity to cogenerate electricity were built despite guaranteed financial backing from the Soviet Union for part of that time. Also at Havana’s disposal were several advanced sugarcane research institutions, such as the Institute for Sugar Investigation (ICINAZ) and the Cuban Research Institute of Sugarcane Derivates (ICIDCA). Gradual decapitalization, disrepair, and low morale, all a result of a largely insufficient investment and a lack of spare parts, brought about the infrastructural deterioration that led Castro to close the majority of the nation’s mills in 2002.¶ It must be noted that Cuba’s ethanol and sugar production capacity will increase exponentially if direct foreign investment, which has been seen only sparingly up to now, is encouraged to enter by direct government policy. Starved by a recurrent shortage of hard currency, new capital inputs needed to modernize Cuban sugar mills would have to come from abroad. To rectify this current shortage, the University of Havana’s Walfrido Alonso-Pippo suggests an investment strategy similar to that used to fuel a Cuban natural gas power plant. He maintains that this “joint venture agreement for a recently constructed natural gas power plant could serve as a model for modernization of [Cuba’s] sugar bioenergy infrastructure. Under this existing arrangement, the foreign partner owns a third of the plant’s output, participates in its management, and receives a proportion of the plant’s profits.” Dr. Alonso-Pippo goes on to note that legal, institutional and political barriers to investment in Cuba have tended to remain a major obstacle, though recent heavy foreign investments in Brazil’s sugar ethanol production facilities suggest the feasibility of similar investments in Cuba.

#### Raul Castro may allow direct foreign investment in the sugarcane ethanol industry

Squatriglia 8 (Chuck Squatriglia, a writer for Wired, “With Fidel Gone, Will Cuba Become a Global Ethanol Player?”, Wired, a magazine and online periodical that reports on how new and developing technology affects culture, the economy, and politics, 2/19/08, http://www.wired.com/autopia/2008/02/with-fidel-gone//HZ)

Fidel Castro hated ethanol. He thought it punished the poor by driving up food prices. But Cuba produces a lot of sugar, and with Fidel’s brother Raul – a fan of biofuels – expected to call the shots, Cuba could become a key player in the global ethanol game.¶ It wouldn’t happen overnight, and it would take a huge investment in Cuba’s rickety sugar industry, but Cuba has the potential to produce 3.2 billion gallons of ethanol annually, according to an analysis by Juan Tomas Sanchez of the Association for the Study of the Cuban Economy. Another Cuba expert, Jorge Hernandez Fonseca, puts the figure closer to 2 billion gallons but even that figure would place Cuba third – behind Brazil and the U.S. – in worldwide production.¶ Of course, reaching either of those numbers would require Raul Castro to open the door to foreign investment, but that may not be as unlikely as it sounds. The Washington Post notes there’s speculation that Fidel’s exit opens the door to economic reform like we’ve seen in China, and it’s worth noting Cuba is quietly modernizing its ethanol infrastructure.¶ Raul Castro is seen as a pragmatist more concerned with improving Cubans’ daily lives than spreading la revolución, and according to Reuters he is believed to favor loosening state control on Cuba’s economy. He already has introduced capitalism to the country’s military. The country also has said it would allow foreign investment in its tourism industry.¶ Whether that means he’ll allow foreign investment in the sugar and ethanol industries remains to be seen (Cuba produces about 1.2 million tons of sugar annually, but was the world’s leading producer before Castro took over in 1959), but Cuba started overhauling 11 of its 17 ethanol refineries last year. That’s an expensive proposition, and the money will have to come from somewhere. And its not as if agri-business wouldn’t love to have a piece of that pie. The Wall Street Journal notes that Archer Daniels Midland tried to get in on the Cuban ethanol game in the 1990s but was rebuffed by Fidel. Maybe Raul will be more welcoming.¶ Cuba doesn’t have much need for ethanol, Sanchez writes, and could export as much as 3 billion gallons a year – worth about $7 billion at today’s prices. Don’t look for any of that ethanol to flow in America though. The State Department says it won’t lift the trade embargo on Cuba anytime soon.

### U.S. Trade/Investment Key

#### Increasing trade between the US and Cuba will develop the sugar ethanol industry

Soligo and Jaffe 8

[Ronald Soligo-Scholar at James Baker Institute for Public Policy, Rice Univ., Amy Jaffe-Wallace S. Wilson Fellow in Energy Studies, James A Baker III Institute for Public Policy, Rice Univ., “Energy Balances and the Potential for Biofuels in Cuba,” Cuba’s Energy Future, 2010, kindle]

Since the special period in the early 1990s, Cuba has moved to diversify its agricultural sector in order to emphasize food security. It's not clear whether this was a response to economic and political conditions at the time or represents a permanent shift of agriculture away from depending so heavily on one crop. More recently, in 2008, the Cuban government announced grants of unused land to all private, cooperative, and state farms, as a spur to enhance domestic food production. The introduction of the plan was a response to the fact that in 2007, 55 percent of agricultural land remained idle, an increase from 46 percent in 2002.42 The shift in acreage devoted to food crops has not been successful in terms of increasing food output, 43 but reforms to give farmers more discretion in how they operate might produce better results in the future. But significantly increasing acreage devoted to food crops will not be easy. Food crops are much more fragile than sugarcane, requiring more labor, weeding, pest control, and oversight than cane, which has been referred to as the “widow's crop” because it requires relatively little attention. As noted previously, thousands of farm workers have migrated to urban areas and it will be difficult to lure them back. If economic sanctions are removed and Cuba enters the international commercial system, food security will be less important, and Cuban agriculture will be more likely to respond to international prices. Historically, Cuba has had a comparative advantage in producing sugar, not food crops; so opening the economy to freer trade might favor a return to the dominance of sugar and development of an ethanol industry.

#### U.S. trade key to Cuban ethanol growth

Soligo and Jaffe 8

[Ronald Soligo-Scholar at James Baker Institute for Public Policy, Rice Univ., Amy Jaffe-Wallace S. Wilson Fellow in Energy Studies, James A Baker III Institute for Public Policy, Rice Univ., “Energy Balances and the Potential for Biofuels in Cuba,” Cuba’s Energy Future, 2010, kindle]

Cuba's Future Sugar Industry: Ethanol Scenarios The success of the Brazilian sugarcane and ethanol industry suggests that, despite former President Castro's views on the impossibility of restoring a viable Cuban sugar industry and the impact of sugar cultivation for ethanol production on food supplies, the Cuban sugar industry could have a promising future. The increasing use of biofuels in the transportation fuel mix in the United States and Europe provides a stable and growing market for ethanol, especially sugarcane-based ethanol, which is cheaper to produce than biofuels from other crops. The United States, under the Energy Independence and Security Act of 2007, increased the renewable fuels standard (RFS) to require that the use of biofuels gradually increase, to 36 billion gallons by 2022. Legislators intended that 16 billion of this consumption would come from cellulosic ethanol, but so far the development of a cost-effective production technology has been slow, leaving the market to corn-and sugar-based ethanol. In 2009 the U.S. consumed 11.1 billion gallons of ethanol, almost all of it produced in the United States. U.S. policy favors domestic ethanol production by imposing an import tariff of 54 cents a gallon in addition to a 2.5 percent ad valorem tariff. Tariffs have limited ethanol imports into the United States, but higher prices in Europe have also been a factor. As of 2009, the United States has been suffering from an excess of production capacity, which has depressed prices in the States relative to other importing countries. But as higher U.S. renewable fuel targets kick in and U.S. prices recover from overinvestment in capacity, imported sugar-based ethanol will be competitive with higher-cost U.S. corn-based ethanol in coastal regions of the United States, even if U.S. tariffs persist. Given the high costs to transport corn-based ethanol to coastal regions from the U.S. Midwest by rail or truck. 41 Cuba's location gives it a large transport cost advantage over both domestic and foreign rivals. Our analysis suggests that Cuba can produce 2 billion gallons of ethanol per year, equivalent to 94,500 barrels per day of gasoline, after adjusting for the differences in energy content. To arrive at this estimate we consider several factors that help determine ethanol output: —The amount of land planted with sugarcane —Yields (the amount of sugarcane harvested per hectare planted) —The industrial yield (the amount of ethanol that can be produced from one ton of sugarcane) —The proportion of sugarcane devoted to the production of sugar and other non-ethanol products Amount of Land Planted with Sugarcane Figure 4-2 shows the area of sugarcane harvested each year from 1961 to 2008. In 1970, the year of the ambitious campaign to produce 10 million tons of sugar, the area harvested was 1.5 million hectares, the highest level in the post-World War II period. Between 1971 and 1989 the area harvested averaged 1.28 million hectares, fluctuating between 1.14 million and 1.42 million hectares. After the collapse of the USSR and the end of Soviet aid, the harvested area plummeted, reflecting at first the decline in imported fuel, fertilizer, and other inputs and later, the decision to restructure the industry by shutting down inefficient sugar refineries and switching farms to pasture or other crops.

#### The ethanol market is viable in Cuba but it requires outside assistance

Christian Santiago Patiño 8/1/09 (“THE CUBAN SUGAR DILEMMA: THE PROSPECT FOR A GREEN FUTURE” Christian Santiago Patiño, Cuba in transition: Volume 19, 8/1/09, <http://www.ascecuba.org/publications/proceedings/volume19/pdfs/patino.pdf> da: 7/1/13)

With the price of ethanol hovering at U.S.$2.00 per¶ gallon at the beginning of the year, and taking into¶ consideration that nations such as Canada, China, India, Sweden, and Japan are gradually increasing ethanol consumption, ethanol production presents an enticing opportunity for the cash strapped, sugarcane¶ nation of Cuba (Johnson, 2008). However, whereas¶ Cuba devoted 1.4 million hectares of land to the production of 75 million metric tons (MT) of sugarcane¶ in 1989,2¶ in 2007, the land under sugar cane cultivation was no more than 400,000 hectares and sugarcane¶ production was less than 12 million MT (CEPALSTAT, 2009). If Cuba were to restore sugarcane production to its pre-1990 levels, Cuba could manufacture an annual supply of 1.5 billion gallons of ethanol,¶ earn over U.S. $3 billion,3¶ and become the third largest¶ exporter of ethanol in the world (see Table 1).¶ But for Cuba to produce ethanol at an international¶ scale it must acquire the needed technology—at the¶ moment the few Cuban distilleries that could potentially be converted into ethanol factories are small and¶ their capacity is limited to a trivial volume of 84 million gallons a year.4¶ Given that the Cuban regime does¶ not have the capital to finance the development of the¶ ethanol sector, capital will have to be injected from the¶ outside and as investor asses their risks they will evaluate the backward and forward linkages of the Cuban¶ sugarcane sector as well as trends in the world demand¶ for ethanol.

#### Investment key to ethanol production

**Squatriglia 2008**(Chuck Squatriglia: Reporter for “Wired” a graduate of Texas A&M. Wired: "With Fidel Gone, Will Cuba Become a Global Ethanol Player?" <http://www.wired.com/cars/energy/news/2008/02/cuba\_ethanol>.)

Fidel Castro hates ethanol. He thinks it punishes the poor by driving up food prices. But Cuba produces a lot of sugar, and **with Fidel's brother Raul -- a fan of biofuels -- calling the shots (at least for the time being), Cuba could become a key player in the global ethanol game.** It wouldn't happen overnight, and it would take a huge investment in the country's rickety sugar industry, but **Cuba has the potential to produce 3.2 billion gallons of ethanol annually**, according to an analysis (.pdf) by Juan Tomas Sanchez of the Association for the Study of the Cuban Economy. Another Cuba expert, Jorge Hernandez Fonseca, puts the figure (.pdf) closer to 2 billion gallons but even that figure would place Cuba third -- behind Brazil and the United States -- in worldwide production. **Of course, reaching either of those numbers would require Raul Castro to open the door to foreign investment**, but that may not be as unlikely as it sounds. The Washington Post notes there's speculation that Fidel's exit opens the door to economic reform like we've seen in China, and it's worth noting Cuba is quietly modernizing its ethanol infrastructure. Raul Castro is seen as a pragmatist who is more concerned with improving Cubans' daily lives than spreading la revolución, and according to Reuters he is believed to favor loosening state control on Cuba's economy. **The country has said it would allow foreign investment** in its tourism industry. Whether that means he'll allow foreign investment in the sugar and ethanol industries remains to be seen (Cuba produces about 1.2 million tons of sugar annually, but was the world's leading producer before Castro took over in 1959). **Cuba started overhauling 11 of its 17 ethanol refineries last year. That's an expensive proposition, and the money will have to come from somewhere**. And its not as if agribusiness wouldn't love to have a piece of that pie. The Wall Street Journal notes that Archer Daniels Midland tried to get in on the Cuban ethanol game in the 1990s but was rebuffed by Fidel. Perhaps Raul will be more welcoming.

#### Investment key to developing biofuels

**Posner 2008 (**Andy Posner: Environmental Studies masters student at Brown University. TreeHugger:"Cuba: Can 'Red' Ethanol Be Green?"  <http://www.treehugger.com/cars/cuba-can-red-ethanol-be-green.html>.)

After 49 years in power, Fidel Castro has stepped aside and allowed his brother Raúl, 76, to become president. While hopes that "a younger generation might take power" have been washed away, many still expect to see changes with the "pragmatic military officer" in charge. **One of the more surprising changes may come in the form of an ethanol boom in Cuba, where experts believe as much as 2 billions gallon could one day be produced annually, which would place Cuba third in worldwide production.** According to Wired.com, Fidel Castro hated ethanol. He thought it punished the poor by driving up food prices. **But Cuba produces a lot of sugar, and with Fidel's brother Raul - a fan of biofuels - expected to call the shots, Cuba could become a key player in the global ethanol game. Of course, Cuba wouldn't be able to start producing all that ethanol without "a huge investment in Cuba's rickety sugar industry."** And doing so will require the kind of reform that has helped make China the powerhouse that it is: namely, foreign investment. This kind of reform may not be as unlikely as it sounds. According to a Washington Post article entitled '**End of Castro's Rule Opens Door for Reforms,' "Cuba's leaders likely will "want to pursue an incremental, gradual approach to reform"** that does not privatize the large state-run sector but allows a new private sector to grow alongside it." Oh, and by the way, Cuba has been modernizing its ethanol infrastructure, albeit quietly. Given the sorry state of Cuba's economy, and the fact that **the country has little need for ethanol and could easily export it in large quantities, it wouldn't be surprising to see Cuban ethanol in gas stations around the world--except for in the United States, where a trade embargo is still in place.**

### Cuba says Yes

#### Cuba is open for foreign investment in ethanol

Soligo and Jaffe 8

[Ronald Soligo-Scholar at James Baker Institute for Public Policy, Rice Univ., Amy Jaffe-Wallace S. Wilson Fellow in Energy Studies, James A Baker III Institute for Public Policy, Rice Univ., “Energy Balances and the Potential for Biofuels in Cuba,” Cuba’s Energy Future, 2010, kindle]

Issues in Achieving Cuba's Ethanol Potential As noted, estimates of Cuba's ethanol potential will depend on assumptions about the amount of sugarcane that can be planted and harvested, as well as what sugarcane yields can be achieved. More ambitious assumptions will yield higher outputs. For example, Juan Sanchez assumes that Cuba could devote 2 million hectares to sugarcane with yields of 80 tons per hectare and 83.6 liters per ton (6,688 liters per hectare). He projects ethanol output at 13.4 billion liters, or 3.5 billion gallons. 47 Three and a half billion gallons seems unrealistic for the foreseeable future. There is some question as to whether Cuba could ever again attain the 1.5 million hectares of sugarcane harvested in 1970, let alone 2 million. According to Brian Pollitt, the 1970 harvest was achieved only by cutting cane that would normally be left to mature for another season in order to produce a higher sugar yield in the following year. 48 Obviously this is not a sustainable practice if optimal yields are to be achieved. Two billion gallons can be produced with a harvested area of 1.33 million hectares and a yield of seventy-five tons per hectare. That area of cultivation is not too far from the average harvest of 1.28 million hectares that Cuba was able to maintain during the 1970s and 1980s. Yet reaching 1.33 million hectares will require time and substantial investment in farm machinery and restoration of the land, which has been neglected and compacted by the use of heavy Soviet-built harvesting machinery. The land will also have to be tilled and newly planted with sugarcane. Achieving higher sugarcane yields will also require time and investments to acquire or develop higher-yielding sugarcane varieties. Cuban yields averaged only fifty-eight tons per hectare during the 1970s and 1980s, substantially below the seventy-five tons per hectare needed to produce 2 billion gallons of ethanol. Yet other countries, as noted, have achieved or exceeded that yield, and some private Cuban farmers are reported to have achieved even higher yields of 100 tons per acre. 49 Yields, of course, are a function of other factors besides cane variety. The condition of the land, access to water and fertilizer, and other inputs would all need to be considered. Finally, Cuba will have to undertake significant investments in distilleries, transport, storage, and distribution infrastructure if it wants to produce the levels of ethanol that the authors believe are achievable. Investment costs for the biorefineries alone will come to billions of dollars. For example, in 2006, corn-based ethanol plants in the United States cost roughly $ 1.88 per gallon for a capacity of 48 million gallons per year, and $ 1.50 per gallon for capacity of 120 million gallons per year (reflecting significant economies of scale). So even if all new plants in Cuba were built with the larger capacity, it would require $ 3 billion dollars (at 2006 prices) to build sufficient capacity to produce 2 billion gallons. Looking at the Brazilian experience with ethanol is instructive. There, in 1975, the government introduced Proálcool, its national ethanol-production program, as a response to the oil shocks of that decade. It took several decades for Brazil to achieve current agricultural yields and ethanol output. Its approach to promoting ethanol use was to mandate that gasoline be mixed with 10 percent ethanol starting in 1975 and that this proportion should be increased to 25 percent by 1980. The government provided loans for the construction of ethanol plants and guaranteed the price of ethanol. Following the second spike in the price of oil in 1980, the government required Petrobras, the state-owned oil company, to supply ethanol to filling stations and offered a subsidy to auto firms to produce cars that could run on pure ethanol. It is estimated that the government spent over $ 16 billion (in 2005 dollars) between 1979 and the 1990s on subsidies and price supports to promote the industry. 50 Cuba has the advantage of being able to learn from the Brazilian experience, even though the evolution of the industry in Cuba will certainly differ from that in Brazil. Exports could play a larger role at an earlier phase in the development of the Cuban industry. Domestic absorption of ethanol within Cuba will be constrained by the longevity of the existing vehicle stock (which burns only gasoline), the speed with which the number of motor vehicles is increased, and the extent to which new vehicles are “flexfuel” vehicles, able to burn both fossil and biofuels. Cuba has the additional advantage of a more robust international demand for ethanol than was the case when Brazil initiated its policy thirty years ago. Cuba has opened the door to foreign investment in the ethanol sector, and Brazil has expressed interest in sharing its expertise in order to promote the use of ethanol and the development of a market where ethanol is traded like other commodities.

#### Cuba will say yes—Fidel’s opposition irrelevant

Saidak 13

(Thomas Saidak- assistant editor of biofuel newsletter, February 3, 2012, Cuba may allow foreign direct investment in sugarcane ethanol, http://www.biofuelsdigest.com/bdigest/2012/02/03/cuba-may-allow-foreign-direct-investment-in-sugarcane-ethanol/)

In Cuba, the government is considering allowing foreign investment in sugar cane based ethanol production. Tovar Nunes, a Brazilian Foreign Ministry spokesman stated, “Fidel’s resistance in this field is being overcome.” Fidel has historically been against ethanol based on concerns that this would compete with food production. Over the last 7 years, the Cuban sugar industry has seen half the country’s mill close and cultivation drop.¶ Cuba reportedly has the capacity to produce nearly 2 billion gallons per year. If Cuba pursues reaching its full potential, it could become the third largest ethanol producer in the world.¶

#### Cuba wants the plan—they are in early stages to attempt sugar cane ethanol production

Fox News 13

(June 16, 2013, “Cuba plans to build first biofuel power plant”, http://latino.foxnews.com/latino/news/2013/06/16/cuba-plans-to-build-first-biofuel-power-plant/#ixzz2XvHTjbDW)

Cuba plans to build a $60 million power plant fueled by sugarcane residue, marking the island's first foray into electricity generation using biofuel, the official Prensa Latina news agency reported.¶ The plant will be built with Chinese technology and technical support.¶ Construction of the 20 MW power plant will begin at the end of this year at a sugar refinery in the western province of Matanzas, Prensa Latina said.¶ The power plant will burn the sugarcane residue known as "bagazo," but other wood residues could be used as fuel in the future.¶ "This will be the first bioelectric power plant of its type operating in Cuba and the specialists who will be responsible for running it traveled to China for training," Prensa Latina said.¶ Large quantities of sugarcane residue are incinerated in Matanzas and the power plant will use this material to produce renewable energy, "providing economic and environmental advantages," the news agency said.¶ The Cuban government has expressed an interest in recent years in increasing electricity production from renewable sources, such as wood and sugarcane biomass, solar, wind and hydraulic sources.

#### Cuba pushing alternative energy investment—want sugar development

Schrader 12

(Sam Schrader- writer on green energy, June 13th, 2012, “Cuba Wind Energy Investment Cuba to Bolster Renewable Energy Development”, http://www.greenchipstocks.com/articles/cuba-wind-energy-investment/1962)

Cuba is on its way to making a substantial jump into boosting its renewable energy output, harnessing forest biomass, sugar cane, solar energy, wind power and hydraulic energy to meet its needs.¶ The country’s goal is to boost its renewable energy production by at least 12% over the next eight years to attain in the words of the state-run website Cubadebate, “energy security and sovereignty.”¶ “If today only 3.8% of the energy generated in the nation is obtained from renewable sources, in the next eight years we aspire to get to 16.5%,” Cubadebate went on to explain.¶ Over the next year, the government is planning to build a 50 MW wind farm on the eastern part of the island. The government is also looking into installing an additional eight wind farms, which would bring the wind capacity up to 280 MW. Cuba also wants to generate 100 MW from hydraulic sources. Currently, Cuba has 64 MW of hydraulic energy.¶ The biggest untapped source is its solar energy potential. The island’s solar capabilities exceed 2,000 MW, but there are very few solar installations currently on the island.¶ Today, Cuba gets 96% of its electricity from fossil fuels. Certainly not a safe or sustainable way to power an island nation.¶

#### Cuba wants to increase its renewable energy production—via sugar

EFE 12 (EFE, a Spanish international news agency, “Cuba seeks to boost alternative energy production by 12 pct”, 6/10/12, http://latino.foxnews.com/latino/news/2012/06/10/cuba-seeks-to-boost-alternative-energy-production-by-12-pct//HZ)

Cuba is intending to increase its renewable energy production by 12 percent over the next eight years in a governmental push for "energy security and sovereignty," an article posted on the official Cubadebate Web site said.¶ "If today only 3.8 percent of the energy generated in the nation is obtained from renewable sources, in the next eight years we aspire to get to 16.5 percent," Cubadebate said, citing official energy industry figures.¶ The island will try to attain this objective using mainly forest biomass and sugar cane, as well as solar, wind and hydraulic energy.¶ The sugar industry will be "the main support" for the plan and by 2013 the potential exists to increase energy production from biomass by 10 percent, Cubadebate said.

#### Cuba is pushing renewable energy investment

REVE 12 (REVE, a news website of the sector with emphasis on electric vehicles, “Cuba to boost renewable energy use in 2013”, 12/12/12, http://www.evwind.es/2012/12/13/cuba-to-boost-renewable-energy-use-in-2013/26779//HZ)

Cuba has planned to press ahead with new programs in 2013 to boost the use of renewable and clean energy sources such as wind, sun and sugarcane, Minister of Energy and Mines Alfredo Lopez Valdes said Tuesday.¶ The government has set up a committee to outline a strategy and guide investment in the field, Lopez Valdes said during a meeting of Cuban parliament’s Committee on Energy and Environment intended to discuss energy policies for the coming year.¶ It has decided to expand clean energy production in the country following a feasibility study and a decision to curb spending on fuel imports, he added.¶ Cuba already has several wind farms, and plans to open another one next year in northern Las Tunas province with a designed power-generating capacity of 51,000 kilowatts.¶ Also in the pipeline are solar farms in different parts of the country, which are expected to have a combined capacity of 10,000 kilowatts. A 1,000-kilowatt solar farm is currently being built in the central province of Cienfuegos.¶ Officials also have approved a plan to build two power plants that will use residual sugarcane as raw materials.¶ One plant will be located in western Matanzas with a capacity of 20,000 kilowatts, and the other will be set up in central Ciego de Avila with a capacity of 30,000 kilowatts.¶ Cuba meets 50 percent of its energy needs through domestic oil production, with the rest supplemented by imports from its political and economic ally Venezuela.

# Answer To Args

## AT: Cuba Food DA

#### Sugarcane crops don’t trade off with food production

Alonso-Pippo et al. 8

[Walfrido Alonso-Pippo- former Vice-President of the Solar Energy Department at the University of Havana and a former member of the Cuban National Renewable Energies Front, where he was a specialist in biomass energy use, Carlos A. Luengo, John Koehlinger, Pierto Garzone, Giacinto Cornacchia, “Sugarcane energy use: The Cuban case,” Energy Policy, Vol. 36, Issue 6, June 2008, <http://www.sciencedirect.com/science/article/pii/S0301421508000840>]

The average total area of cultivable land in Cuba is 6.66×106 ha. In 1991, 21% of Cuba's cultivable land was used for sugarcane cultivation. At this time, the government implemented a plan to gradually convert a significant percentage of cultivable land dedicated to sugarcane into land for the cultivation of food crops. During the period from 1991 to 2005, the percentage of cultivable land use for the cultivation of sugarcane has been drastically reduced to barely 5% ([Fig. 5](http://www.sciencedirect.com/science/article/pii/S0301421508000840#fig5)). As evidence that the Cuban government's misguided agricultural policies are not limited to the sugar industry, the conversion of land dedicated to sugarcane into land for food production did not bring an increase of food production. A further recent indication that the Cuban agricultural sector is increasingly unable to meet the basic needs of the population is that in 2007 domestic agricultural food production was down 7% compared to 2006 ([Batista, 2007](http://www.sciencedirect.com/science/article/pii/S0301421508000840#bib6)). As a result, 84% of the low-cost government-subsidized foods sold to the Cuban population continue being imported.

#### Sugar solves Cuba’s economy and wont have environmental and food production trade-off’s

Soligo and Jaffe 8

[Ronald Soligo-Scholar at James Baker Institute for Public Policy, Rice Univ., Amy Jaffe-Wallace S. Wilson Fellow in Energy Studies, James A Baker III Institute for Public Policy, Rice Univ., “Energy Balances and the Potential for Biofuels in Cuba,” Cuba’s Energy Future, 2010, kindle]

It is natural to associate Cuba with sugar. At one time, Cuba was the world's largest exporter of sugar. It was a major supplier to the United States before the Cuban Revolution, and to the Soviet Union in the 1970s and 1980s. But the industry has undergone a steep decline since major trade with the Soviet Union ended. Sugar production, as high as 8.1 million tons in 1988, had fallen to 1.25 million tons by 2009.29 Acreage devoted to sugar was reduced by over 60 percent from 2002 to 2008. Sugar mills have been closed, with the number of plants falling from 156 to only 85. In 2006, output of raw sugar was approximately 1.2 million tons, reportedly the lowest output since 1908.30 Oddly enough, the retreat of the Cuban sugar industry has occurred at a time when many countries have been adopting policies to add ethanol, which can be made from sugarcane, to their transportation fuel portfolio. Despite the fact that Cuba is dependent on oil imports and is aware of the demonstrated success of Brazil in using ethanol to achieve energy self-sufficiency, it has not embarked on a policy to develop a larger ethanol industry from sugarcane. In response to recent increases in ethanol prices, there is some support in Cuba for increasing ethanol production. A member of the Cuban Academy of Sciences, Conrado Moreno, has indicated that there are plans to upgrade eleven of the seventeen Cuban refineries to add annual production capacity of as much as 47 million gallons. 31 It remains to be seen whether this will happen without the support of top administration officials, especially Former President Fidel Castro. Castro has rightly pointed out that there can be a direct trade-off between using land for food production and for ethanol. And in many areas of the world, the shift in land use to crops for ethanol has resulted in rapidly rising costs for food. There are also trade-offs between increasing acreage devoted to crops for ethanol and other objectives such as issues related to climate, environment, and biodiversity. In Brazil, for example, increasing acreage under sugarcane cultivation has resulted in shifting other crops to newly cleared areas, often in the rainforest, a process that ultimately could have devastating effects on climate and biodiversity within and beyond Brazil. Cuba, however, has had a traditional comparative advantage in the production of sugar. Although some of the land used for sugar in the past is being shifted to food crops and reforestation, much of it is not currently being cultivated at all. Thus, for Cuba a restoration of the sugar economy does not necessarily have to involve environmental and food production trade-offs.

## AT: Corruption/Demo/Failed State DA

#### Read Democracy 2AC Add-on!

#### The main threat Cuba poses is as a failed state due to lack of investment in sugar cane industry

Ted Piccone, Sun Sentinel February 1, 2011 ( Ted Piccone is a Senior Fellow and Deputy Director for Foreign Policy at the Brookings Institute and he was a senior policy advisor on the Americas during the Clinton administration “Ted Piccone: To effect change in Havana, support the Cuban people” http://www.cubastudygroup.org/index.cfm/newsroom?ContentRecord\_id=682F1582-4325-425C-ABF8-5AC780E0615C)

By any conventional measure, Cuba poses little to no security threat to the United States. Its active military has shrunk from an estimated 235,000 in 1999 to 50,000 10 years later. According to the State Department, the regime no longer has the resources to project power abroad. Its place on the official U.S. list of country sponsors of terrorism continues despite the U.S. government's own conclusion that it provides no direct financial assistance to terrorist groups or armed struggle in the region or beyond.¶ Moreover, Cuba's economy is in woeful condition. Its sugar industry has collapsed due to lower prices, the end of Soviet subsidies, mismanagement and lack of investment, sapping the potential it offers in the era of ethanol. Economic activity has suffered further from multiple devastating hurricanes and droughts. As a result, hundreds of thousands of public employees are being forced off the government payroll with little hope of productive employment in the near future.¶ As Cuba continues its inexorable decline, the United States has remained on the sidelines while others have stepped in to throw Cuba a lifeline. Hugo Chavez's Venezuela has led the way mainly through subsidized oil imports in exchange for Cuban medical services. China and Russia have also increased their trade, investments and direct aid, including a $6 billion investment from China's state oil company to expand Cuba's main refinery. Spain and Canada remain robust partners, particularly in tourism. And although remittances from Cuban exiles play an important part both in improving the lives of the Cuban people and generating revenue for the state, most reports indicate life has gotten noticeably worse for most Cubans over the last decade.¶ If anything, the United States' main concern now should be the potential of a failed state just 90 miles from its borders. Given the austerity measures recently adopted by President Raul Castro, we should not be surprised to see an influx of Cuban economic migrants to our shores, reviving fears of the chaos and turmoil generated during the rafters crisis of the early 1990s.

## AT: Foreign Investment Now

#### Cuba overstates foreign investment

Soligo and Jaffe 8

[Ronald Soligo-Scholar at James Baker Institute for Public Policy, Rice Univ., Amy Jaffe-Wallace S. Wilson Fellow in Energy Studies, James A Baker III Institute for Public Policy, Rice Univ., “Energy Balances and the Potential for Biofuels in Cuba,” Cuba’s Energy Future, 2010, kindle]

Large foreign investments, in both the energy and non-energy sectors, have been announced in recent years, but it is difficult to estimate actual foreign investment, since there is always a discrepancy between announcements of investment plans and their actual completion. Cuba has not published data on foreign direct investment since 2001.9 In addition to Venezuela's investments, some significant projects include a Brazilian loan of up to $ 450 million to rebuild the port at Mariel to handle larger ships— possibly in anticipation of the end of the U.S. embargo. 10 An end to U.S. economic sanctions would allow Cuba to become an important trans-shipping hub serving overcrowded U.S. ports, possibly sidestepping U.S. environmental restrictions. (The end of U.S. economic sanctions would also open the possibility that Cuba's petroleum-refining industry could export surplus refined products to the U.S. market.) China has announced plans to invest $ 500 million in Cuba's nickel mining industry. 11 And Russia's Inter RAO UES, an energy company, has recently agreed to form a partnership with Cuba's Unión Eléctrica to upgrade some electricity-generating plants. 12 Cuban growth has stagnated since 2009 for a number of reasons, most of them related to the worldwide economic recession. The collapse of nickel prices along with a drop in spending by tourists has severely reduced foreign exchange earnings. Foreign investments have been postponed, including those in the energy sector. In addition, several major hurricanes in 2008 diverted resources away from development to relief efforts and reconstruction.

## AT: Venez solves Cuba’s Econ

#### Venezuelan oil trade with Cuba is a bad deal for Venezuela

Soligo and Jaffe 8

[Ronald Soligo-Scholar at James Baker Institute for Public Policy, Rice Univ., Amy Jaffe-Wallace S. Wilson Fellow in Energy Studies, James A Baker III Institute for Public Policy, Rice Univ., “Energy Balances and the Potential for Biofuels in Cuba,” Cuba’s Energy Future, 2010, kindle]

The extent of Venezuelan aid is not fully transparent. Cuba is importing around 92,000 barrels a day (b/ d) from Venezuela under favorable terms. Some of the oil is financed by loans, part is a barter trade involving some 20,000 Cuban medical professionals who work in Venezuela, and some oil is provided as an outright grant. Venezuela has also financed the completion of the Cienfuegos refinery, which was opened at the end of December 2007, with plans to increase the plant's capacity from around 65,000 b/ d to 150,000 b/ d. 7 Venezuela has also provided $ 122 million to finance the acquisition of tankers to carry Venezuela crude and products to Cuba.

## AT: PTX

#### No Link—corn ethanol lobby has lost power

Specht 13

[Jonathan-J.D. Wash. U St. Louis, Legal Advisor, “Raising Cane: Cuban Sugarcane Ethanol’s Economic and Environmental Effects on the United States,” Environmental Law & Policy Journal, Univ. of California Davis, Vol. 36:2, <http://environs.law.ucdavis.edu/issues/36/2/specht.pdf>]

Ethanol currently makes up a relatively small portion of U.S. fuel usage. As of 2011, domestically produced ethanol was replacing about ten percent of U.S. gasoline consumption. n13 The vast majority of this ethanol is produced from corn. Currently, in the United States, domestically produced ethanol is virtually synonymous with corn-based ethanol. n14 "In the world of U.S. bio-ethanol corn is king." n15¶ The domestic ethanol industry grew in large part due to governmental support. At the end of 2011, however, the federal tax credit for ethanol expired, n16 and the future of federal involvement in promoting ethanol remains in doubt pending the passage of a new Farm Bill. Before the end of 2011, ethanol was, as Senator Dianne Feinstein said, "the only industry that benefits from a triple crown of government intervention: its use is mandated by law, it is protected by tariffs, and companies are paid by the federal government to use it." n17 Although there have also been too many smaller federal and state incentives for the industry to list n18 (e.g. loan guarantees for refinery [\*176] construction), the three policies mentioned by Senator Feinstein were the primary means by which the government fostered the growth of the domestic ethanol industry. These three policies were the Renewable Fuel Standard (RFS), n19 the Volumetric Ethanol Excise Tax Credit (VEETC), n20 and the tariff on imported ethanol. n21 Of these three, only the RFS is law as of January 2013.¶ These three policies worked together in the 2000s to encourage the domestic ethanol industry and protect it from foreign competition. The RFS was established in 2007 as part of the Energy Independence and Security Act of 2007. n22 In the words of a USDA Economic Research Service report summary, the RFS "specifies not just the total level of [U.S.] biofuels to be used until 2022, but also target levels for fuels produced from major feedstock categories." n23 The Volumetric Ethanol Excise Tax Credit, or VEETC, gave those who blended or marketed ethanol a forty-five cent per gallon tax credit for every gallon of ethanol blended with gasoline. n24 Finally, the ethanol tariff was a fifty-four cent tariff on each gallon of ethanol that was imported into the United States. n25 While these provisions may be re-instated in a future Farm Bill passed by a more ethanol-friendly Congress, through 2012 bi-partisan pressure against federal support for the ethanol industry was enough to keep them from being revived. n26¶ The degree to which the federal government decided to support the corn-based ethanol industry may have reflected more on the industry's ability to influence national politics than on its merits as an endeavor. "The emergence of corn as the primary feedstock for U.S. ethanol is the product of its abundance and political prowess." n27 The domestic ethanol industry has very strong ties to one region of the United States, the Midwest. More than eighty-five percent of U.S. ethanol bio-refineries are in the twelve states of the Midwest, the premier [\*177] corn growing region of the United States. n28 According to the most recent data from the U.S. Energy Information Administration, there are 172 ethanol plants in the Midwest and just twenty-two plants in all other regions of the United States combined. n29 U.S. corn production is concentrated in the Midwest, with just Iowa and Illinois together providing about one third of the annual United States crop. n30¶ Due to a number of circumstances, some of them coincidental, the states with the most to gain from federal policies supporting corn-based ethanol have in recent years been some of the most politically influential states. Iowa's disproportionate political influence as the home of the country's first presidential nominating contest is a notorious idiosyncrasy of the U.S. political process, n31 but this is far from the only political quirk that has benefitted the domestic ethanol industry. In the twenty-year period between 1985 and 2005, the Senate Majority or Minority Leader of either the Republican or Democratic parties was from the Midwest. n32 In the eight-year period between 1999 and 2007, the Speaker of the House n33 was from Illinois, the number two state for corn production. Additionally, during the six-year period from 1989 and 1995, the House Democratic Leader n34 not only represented Missouri, a top ten corn producer state, n35 but also represented the congressional district containing the headquarters for Monsanto, a major global agricultural corporation heavily involved in U.S. corn production. n36 Thus, in the two-decade period between the mid-1980s and mid-2000s, the U.S. corn industry had a "perfect storm" of circumstances giving it political influence and the opportunity to favorably [\*178] shape U.S. agricultural policy.¶ In the 2010 elections, however, corn-based ethanol suffered a dramatic reversal of its political fortunes. Neither the current Senate Majority Leader nor Senate Minority Leader n37 is from a major (that is, top ten) corn producing state. n38 While the Speaker of the House n39 is from a major corn producing state, n40 neither the House Majority Leader nor Minority Leader n41 is from a state with significant corn production. n42 Additionally, and perhaps much more significantly, the composition of the House Agriculture Committee changed in a number of ways with the 2010 election.¶ In the 2010 election, the Democratic Party narrowly retained control of the U.S. Senate, while the Republican Party took control of the U.S. House of Representatives. While congressional party shifts are a routine occurrence in American politics, the 2010 elections were notable in two respects. They brought a large number of freshmen to the House of Representatives, as well as a large number of representatives who campaigned on platforms explicitly opposing government spending and government action in general. n43 This shift in the larger House of Representatives was reflected in the change in composition of the House Agriculture Committee. Half of the members of the current committee - sixteen of the Republicans and seven of the Democrats - were new to the committee. n44 Characterized by a desire to cut government spending wherever possible, these new committee members pushed for reductions in all forms of federal agricultural subsidies in debates over the 2012 Farm Bill. Their opposition prevented the House of Representatives from passing a final version of the Farm Bill before the end of 2012. n45 Because of the U.S. budget deficit, it is certain that the next Farm Bill - a final version of which had not been agreed to by Congress as of January 2013 - will cut federal agricultural spending. The unanswered questions are which programs will be cut, and by how much.

#### There is already a movement in congress to spur agricultural trade

Kieth Good July 3, 2013 (Kieth Good, “Farm Bill; Biofuels; Trade- Cuba; Ag Economy; Climate Change; Financial Regulation; and Political Notes” July 3, 2013 <http://farmpolicy.com/2010/04/30/farm-bill-biofuels-trade-cuba-ag-economy-climate-change-financial-regulation-and-political-notes/>)

“President Barack Obama’s election in November 2008 stirred hopes throughout the Hemisphere that the United States would move to end the embargo codified by Congress in 1963 and strengthened twice in the 1990s.”¶ The article explained that, “Representative John Tanner, chairman of a trade subcommittee in the House of Representatives Ways and Means, called the hearing on Thursday to examine a bill crafted by House Agriculture Committee Chairman Colin Peterson, a Democrat, and Republican Representative Jerry Moran.”¶ Mr. Palmer indicated that, “A March study by Texas A&M University estimated that approving the Peterson-Moran bill to lift the travel ban and ease agricultural export restrictions could lead to $365 million in additional sales of U.S. goods and create 6,000 jobs in the United States, [Myron Brilliant, senior vice president for international affairs at the U.S. Chamber of Commerce] said.”

#### Obama already pushing a shift U.S. off of oil

Hoft 3/13

(Jim Hoft ,March 17, 2013 “Obama Says US Must Shift Cars Off of Oil & Onto Biofuels “, http://www.thegatewaypundit.com/2013/03/obama-says-us-must-shift-cars-off-of-oil-onto-biofuels/#sthash.e2qddyWZ.dpuf)

Barack Obama wants to blow another $2 billion on electric cars and biofuel research.¶ Charter.net reported, via Free Republic:¶ Envisioning cars that can go “coast to coast without using a drop of oil,” President Barack Obama on Friday urged Congress to authorize spending $2 billion over the next decade to expand research into electric cars and biofuels to wean automobiles off gasoline.¶ Obama, expanding on an initiative he addressed in his State of the Union speech last month, said the United States must shift its cars and trucks entirely off oil to avoid perpetual fluctuations in gas prices. Citing policies that already require automakers to increase gas mileage, he said he expects that by the middle of the next decade, Americans will only have to fill up their cars half as often.¶ “We’ve set some achievable but ambitious goals,” Obama said, speaking at Argonne National Laboratory outside Chicago¶ “The only way to break this cycle of spiking gas prices — the only way to break that cycle for good — is to shift our cars entirely, our cars and trucks, off oil,” the president said.¶ Friday’s speech, with its focus on energy, was designed to draw attention to what the White House says is one of Obama’s top agenda items for his second term. That focus, however, has been overshadowed as the administration and Congress work on an immigration overhaul, gun legislation and deficit-reduction measures.¶ Obama cast his proposal as not only a clean energy plan, but as one meant to create opportunities for economic growth.¶

## AT: Econ/Midwest DA

#### Midewest corn wont bottom out—corn will still be viable b/c global pressures

Specht 13

[Jonathan-J.D. Wash. U St. Louis, Legal Advisor, “Raising Cane: Cuban Sugarcane Ethanol’s Economic and Environmental Effects on the United States,” Environmental Law & Policy Journal, Univ. of California Davis, Vol. 36:2, <http://environs.law.ucdavis.edu/issues/36/2/specht.pdf>]

Even if corn-based ethanol production were to decline, U.S. corn prices are likely to remain relatively high for the near-to-midterm future. This is mainly due to global rise of the middle class, a resource-intensive phenomenon that is especially pronounced in countries like India and China and is driving up prices for a large number of commodities. n167 For example, if the Chinese economy continues to grow and more Chinese citizens move from rural areas to cities, join the middle class, and therefore start eating more pork, n168 there will be [\*198] upward pressure on demand for U.S. corn and therefore on U.S. corn prices. n169 Thus, because of factors outside of the entire debate over importing ethanol from elsewhere in the Western Hemisphere (and indeed, outside anything in the Western Hemisphere) a reduction in demand for corn-based ethanol would not necessarily lead to low corn prices.

Plan boosts multiple U.S. agg sectors

Specht 13

[Jonathan-J.D. Wash. U St. Louis, Legal Advisor, “Raising Cane: Cuban Sugarcane Ethanol’s Economic and Environmental Effects on the United States,” Environmental Law & Policy Journal, Univ. of California Davis, Vol. 36:2, <http://environs.law.ucdavis.edu/issues/36/2/specht.pdf>]

C. Economic Effects of Cuban Ethanol on the United States Generally¶ ¶ Outside of the Midwest and Florida, from a purely economic (rather than environmental and economic) perspective, the question of whether the United States should replace a portion of its gasoline with domestic corn-based ethanol or Cuban sugarcane-based ethanol would appear to largely be a wash. On one hand, the U.S. trade deficit would increase to the extent that a domestically produced product was replaced by imports. On the other, opening trade relations with Cuba generally would open many opportunities for exports from the United States to that country. This could include exports of corn and other products from the Midwest. Perhaps the primary U.S. beneficiaries of replacing a portion of domestic corn-based ethanol with Cuban sugarcane-based ethanol, outside of Florida, would be livestock farmers and ranchers. The primary economic considerations for whether a given dairy, beef, pork, or chicken operation can be profitable are the costs of feed and the price of the product sold (milk, beef, pork, or chicken). By driving up the cost of corn, the domestic corn-based ethanol industry threatens the profitability of U.S. livestock operations. n183 Thus, importing sugarcane-based ethanol from Cuba could actually benefit a sector of the U.S. agricultural industry - including the portion of it in the Midwest - by lowering demand for corn and thus the price of corn¶

#### Plan boosts Florida economy it makes up for trade-offs with the Midwest in overall economic growth

Specht 13

[Jonathan-J.D. Wash. U St. Louis, Legal Advisor, “Raising Cane: Cuban Sugarcane Ethanol’s Economic and Environmental Effects on the United States,” Environmental Law & Policy Journal, Univ. of California Davis, Vol. 36:2, <http://environs.law.ucdavis.edu/issues/36/2/specht.pdf>]

B. Economic Effects of Cuban Ethanol on Florida¶ ¶ If the Corn Belt is the most likely regional economic loser from the changes in U.S. law and policy encouraging the growth of a Cuban sugarcane ethanol industry, Florida is the most likely regional economic winner. In the broader economic context, Florida has the most to gain of any state from free and open relations between the United States and Cuba. n170 The degree to which Florida would gain from the growth of a Cuban sugarcane ethanol industry would depend how U.S. legal and policy changes designed to encourage this industry were structured.¶ Although Cuba was never mentioned as a possible source of ethanol, n171 the goal of making Florida a center for international trade in ethanol has been pursued by American policymakers before. Between 2006 and 2008, the Bush Administration and two gubernatorial administrations in Florida promoted the cause of ethanol, both within the state and from abroad. In the spring of 2007, President Bush pursued an agreement with Brazil on importing ethanol. n172 While Florida did its part to promote the ethanol industry within the state, the international side of the initiative went nowhere. Congress refused to change ethanol tariff policy in the 2008 Farm Bill. Moreover, the subsequent Obama Administration has been uninterested in pursuing such an agreement with Brazil or any other country to increase imports of ethanol. n173¶ [\*199] While the previous initiative was directed towards ethanol from Brazil, Colombia, and other Latin American nations, the economic benefits to Florida of a hemispheric ethanol trade would apply equally if this trade included Cuba (and perhaps more strongly, as Cuba is close to Florida, especially as compared to Brazil). The international ethanol trade's economic boost to the state would include increased traffic at Florida's ports, increased activity at Florida banks financing international trading arrangements, and perhaps even the creation of an international ethanol exchange in Miami similar to the Chicago Mercantile Exchange. n174¶ Florida has a large population, coastal location, and is a great distance from other East Coast population centers further north (as well as from the Midwestern center of U.S. ethanol production). Given those circumstances, it would be practical for as much imported ethanol as possible to be used within Florida if Cuban sugarcane became a source for U.S. ethanol consumption. Florida represents a large potential market for ethanol. As of 2006, drivers in the state consumed 8.37 billion gallons of gasoline per year, n175 and ethanol has only recently begun to be marketed in Florida (it was first blended into gasoline in the state in 2007). One way to greatly increase the state's ethanol consumption would be to widen the availability of Flex Fuel Vehicles and gas stations that sell E-85 (a blend of gasoline that is eighty-five percent ethanol). According to the U.S. Department of Energy's Alternative Fuels and Advanced Vehicles Data Center, forty-four Florida gas stations now sell E85 blends. n176 Though this represents a rapid increase in availability, given that ethanol has only been marketed in the state for five years, it is still a relatively small number. (Iowa, which has a fraction of Florida's population, has over 100 more stations selling E-85). n177¶ Ethanol from Cuban-grown sugarcane could enter the gasoline supply of Florida in one of two ways: sugar could be refined into ethanol in Cuba and then shipped to the United States, or Cuban sugar could be shipped to the United States and refined into ethanol domestically. Which method would be more economical would depend on commodity prices and, especially, which law and policy changes the United States had made to encourage the development of Cuban sugarcane ethanol. Depending on the difficulty of Cuba's post-Castro [\*200] transition and ability to attract foreign investment for creating an ethanol industry, refining Cuban sugar into ethanol in Florida could represent a mid-term stage in the development of U.S. utilization of Cuban sugar as a fuel source.¶ According to a report from the U.S. Biomass Board, "The attractiveness of one [biofuel] feedstock over another will also be determined by the cost of delivering that feedstock from "root to refinery.' That cost will be a function of harvesting and collecting costs, which vary with the weight and bulk of the feedstock, and distance to the biofuel plant. Transportation costs are a major issue for many ethanol producers." n178 Shipping Cuban sugar by sea to an ethanol refinery in Florida would be a low cost transportation option. n179 Additionally, according to a 2006 report from the USDA's Office of the Chief Economist, the capital expenditure costs of building a new sugarcane ethanol plant would be substantially reduced if it were built adjacent to an existing sugar production facility. n180 Thus, some of Florida's existing sugar refineries could also become ethanol refineries at a lower cost than building a completely new ethanol refinery.¶ Looking further into the future, a dedicated ethanol pipeline has been proposed to bring ethanol from the corn-producing Midwest to the fuel-hungry East Coast. n181 If a stable and consistent international ethanol trade arises with Florida as its U.S. entrepot, eventually a dedicated ethanol pipeline could be built from Florida to Atlanta (a major fuel consuming city). n182 This would be [\*201] beneficial both in stimulating Atlanta's fledgling ethanol market and bringing construction jobs to the states of Florida and Georgia.

## AT: Cellulous Ethanol CP

#### Second generation cellulosic ethanol is not a viable option right now. We don’t have the tech and it is too expensive.

Jonathan Volinski 2012

( Jonathan Volinski. J.D. candidate 2013, Tulane University Law School; B.A. 2008, Political Science & History, Syracuse University. Mr. Volinski wishes to thank the staff of the Tulane Environmental Law Journal for their continued guidance and support. “Shucking Away the Husk of a Crop Gone Wrong: Why the Federal Government Needs To Replant Its Approach to Corn-Based Ethanol,” Tulane Environmental Law Journal, Summer 2012, Lexis/Nexis)

Ethanol, or ethyl alcohol, is a clear, colorless liquid that can be produced from starch-based feedstocks such as corn, sugar-based feedstocks such as sugarcane, or cellulosic feedstocks such as grass, wood, crop residues, or old newspapers. n6 Ethanol works well in internal combustion engines and is high in octane, which helps engines generate more power. n7 Because internal combustion engines almost exclusively power today's cars, many people view ethanol as an attractive alternative to gasoline.¶ Much of the current supply of ethanol is derived from corn and sugar cane. New sources continue to be developed, but not without difficulty. Ninety percent of the ethanol in the United States is produced from corn; n8 this is primarily because corn grows particularly well in America's heartland. Other countries with a more tropical climate, such as Brazil, produce the majority of their ethanol from sugarcane. n9 Brazil's production method has proven to be both more efficient and cost-effective, because its sugar-based ethanol yield is eight times more productive than U.S. corn-based ethanol. n10¶ This has led many in the United States to advocate for second generation cellulosic ethanol, which is derived from nonfood sources such as wood waste, crop waste, and certain grasses like switchgrass and miscanthus. n11 Second generation cellulosic sources are advantageous because they do not require croplands and cellulosic sources can produce as much as five times more energy than they take to grow, harvest, and deliver. n12 Cellulose conversion technologies, however, have been elusive, [\*510] expensive, and production has not yet moved beyond the pilot stage. n13 Indeed, billionaire Vinod Khosla's Range Fuels received $ 6.2 million from the State of Georgia, $ 76 million from the United States Department of Energy (DOE), and an $ 80 million loan guarantee from the United States Department of Agriculture (USDA) to build the nation's first cellulosic ethanol plant. n14 After spending half of that amount, Range Fuels went bankrupt, never producing a single drop of commercially viable ethanol. n15 Irate taxpayers, who had to foot the bill, are calling the project a waste and liken the situation to the failed solar power company, Solyndra. n16

**Sugar ethanol is key to fill-in during the cellulose transition**  
Outlaw et al. 7

[Joe Outlaw-professor and extension economist, Luis Ribera is an assistant professor and extension economist. James Richardson is a regent's professor. Jorge da Silva is an associate professor. Henry Bryant is a research assistant professor. Steven Klose is an assistant professor. All are agricultural economists at Texas A&M University, except for da Silva, who is a soil and crop scientist, “Economics of Sugar-Based Ethanol Production and Related Policy Issues,” Journal of Agricultural and Applied Economics, Vol. 39, Issue 2, pg. 357-363]

Although corn-based ethanol production has been profitable over the past few years, the near doubling of corn prices in late 2006 and early 2007 has significantly reduced ethanol plant profitability. With almost 20% of the U.S. corn crop now being used in ethanol production, the food versus fuel versus feed debate is starting to gain national and worldwide attention. Although most believe that the future of ethanol production in the United States and the world lies with cellulosic production, during the transition period, ethanol could potentially be produced in the United States from sugarcane, thereby mitigating some of the problems in the food and feed sectors due to high corn prices.¶ The United States has a long history of supporting sugar producers with a price support and marketing quotas (Lord). These instruments generally lead to domestic sugar prices that have been five or six times higher than world sugar prices, although currently, they are only 50% higher than the world price. To maintain the higher domestic sugar price, the United States limits the amount of sugar imports to a few countries, each having the right to export specific quantities to the United States. Under the negotiated terms of the North American Free Trade Agreement, Mexico will soon (January 2008) be able to export unlimited duty-free quantities of sugar to the United States. Although there are some who do not believe that Mexico will export significant quantities of sugar to the United States in 2008, the potential is there to create significant pressure on the U.S. sugar program. Ethanol production could be an option in the event the sugar program has to change because of pressure from imports.

## AT: Carbon Tax CP

### No Solve

#### Carbon Pricing Fails – only clean energy innovation solves climate change

Yin 2012

(Clifton, Clean Energy Policy Analyst at the Information Technology and Innovation Foundation, “The Carbon Tax Fantasy”, November 19, http://thebreakthrough.org/index.php/programs/energy-and-climate/the-carbon-tax-fantasy/)

According to the neoclassical economic doctrine, as detailed in the ITIF paper Economic Doctrines and Approaches to Climate Change Policy, the economy is a “large market of goods and services that is generally in equilibrium and usually best left to itself.” Climate change is viewed by doctrine adherents as a rare market failure, but one that can be addressed by simply implementing a market signal to control for the negative externality of greenhouse gas emissions. The paper thus concludes, “Neoclassical economists believe that setting a price on carbon—through a carbon tax or cap and trade—is the principal and often sole policy response needed to address climate change.” Case in point: Paul Krugman’s observation in his New York Times column that “If you seriously believe in markets, you should believe that given the right incentives — namely, putting a price on emissions, through either a tax or a tradable permit scheme — the economy will find lots of ways to emit less.” Nevertheless, a Brookings paper released last week by Mark Muro and Jonathan Rothwell throws yet another bucket of cold water on the idea that a carbon tax is a “one and done” climate change solution: Numerous scholars have demonstrated that, while the scale of the needed carbon emissions reductions is extremely large, price-based systems by themselves are not likely to induce sufficient technology change to deliver the needed reductions, particularly given the “lock-in” of cheap, readily available dirty technologies and the modest pollution prices that are tolerable to politicians…A major problem with all carbon pricing solutions is the fact that the private sector will not (for recognized reasons) invest adequately on its own in low-carbon solutions and technology change – even in the presence of carbon pricing. As such, a carbon tax can only be seen as effective climate change policy in the extent to which it funds clean energy innovation. In contrast to the neoclassical economic doctrine, innovation economics recognizes that the government can and should play a much more proactive role in supporting the clean energy innovation process. Fittingly, the Brookings scholars recommend setting aside at least $30 billion in carbon tax revenue annually for “an independently managed fund for supporting top-quality energy-system RD&D activity.” That policy proposal mirrors the “innovation carbon price” concept put forward by ITIF last year that called for a portion of revenue to go towards funding “a Clean Energy Innovation Trust Fund that would support clean energy innovation initiatives.” Establishing a dedicated revenue stream for clean energy innovation in this way would simultaneously reduce policy uncertainty and tackle climate change mitigation in a meaningful way. Nor would it be without precedent – gas tax revenue, for example, is dedicated to the Highway Trust Fund.

#### Incentives for clean tech are comparatively better

Shellenberger and Nordhaus, 2012 (Michael, President of the Breakthrough Institute; Ted, Chairman of the Breakthrough Institute; “Should We Swap Energy Subsidies for a Carbon Tax?” September 13, http://thebreakthrough.org/index.php/voices/michael-shellenberger-and-ted-nordhaus/should-we-swap-energy-subsidies-for-a-carbon-tax/)

In order to make an apples-to-apples comparison between the disincentive provided by a carbon tax and the incentive provided by subsidies, we converted the subsidies into their "carbon tax equivalent," a commonly used conversion among climate and energy analysts. Breakthrough examined the effect of a carbon tax in the range of $10 - $20. Europe has a carbon price of about $10/ton. Climate legislation that passed the House and failed in the Senate in 2010 would have set a carbon price around $12 per ton, and McDermott's legislation references a $15/ton price. Current annual federal spending on clean tech deployment subsidies totaled $11 billion in 2012, which is equivalent to a tax of $2.10/ton of carbon dioxide. At its 2009 stimulus peak, federal spending on clean energy subsidies amounted to $29.6 billion, equivalent to a tax of $5.50/ton CO₂. A $20/ton carbon tax would impose a cost of $100 billion annually on the economy. That number is 900% more than the carbon tax that would be required to simply fund today’s subsidies. What a $20 carbon tax might do is modestly accelerate the switch from coal to natural gas. But that trend is already underway, and the existing incentive provided by today's price gap between coal and (cheaper) gas is about twice large as the one that would be provided by a $20 carbon tax. Our findings are consistent with the findings of other recent studies (MIT 2012) that find that a $20 per ton carbon tax — rising slowly to $90 per ton by 2050 — would have a modest effect on emissions. Breakthrough's analysis likely underestimates the incentive provided by direct subsidies. Renewable subsidies help developers and utilities overcome the economic and technical challenges to deployment. Loan guarantees, and insurance subsidies help lower the risk and finance costs of nuclear projects. By contrast, a carbon tax simply raises the cost of the incumbent without helping the challengers cover the costs of first entering the market. There are good reasons to tax carbon — we favor a low one (e.g., $5/ton) to raise money for energy innovation. But what this analysis shows is that the deployment of low-carbon energy is not one of them.

#### Pricing fails – only investment in clean tech solves

Breakthrough, 3/5 (Breakthrough Institute, “Breakthrough’s Nordhaus vs. EDF’s Krupp”, 2013, http://thebreakthrough.org/index.php/programs/energy-and-climate/breakthroughs-nordhaus-vs.-edfs-krupp/)

Nordhaus strongly rejected Krupp’s approach: “If there is one thing that is really now clear, it's that, or should be, it's that we are not going to price, cap, or regulate our way to a low carbon future,” he said. “The reasons for that are part political and part technological.” Current low carbon resources face severe technological hurdles, coming up short in terms of scale, cost, intermittency, and other non-market barriers to widespread deployment. Meanwhile, “no political economy in the world has been willing to raise the cost of energy sufficiently to deploy significant amounts of zero carbon energy” because of the importance of cheap energy to living standards and economic competiveness. “The key to making progress, both politically and substantively, meaning actually putting policies in place that actually have an impact on emissions, is developing energy technologies that are clean, cheap, and abundant,” Nordhaus argued. He pointed to decades of government support that helped bring about the shale gas revolution as an example of how public funds should be used to accelerate the development of new clean energy technologies. Krupp countered by claiming that, with a price on carbon, the private market will bring about the investment in and development of new technologies needed to combat climate change. “We're in this fix because the people invest in things that are profitable, and things are profitable when you don't price carbon,” he said. “Once we get capitalism and entrepreneurs harnessed to invent, have a profit motive to bring to market the technologies that are clean, there's reason to be very hopeful.” And yet, Nordhaus said, in an important exchange highlighting divergent views over how innovation happens, “there's almost no evidence for that hypothesis in response to environmental pricing.” In the end, the effectiveness of any attempt to regulate or price carbon depends on cheaper and cleaner substitutes for coal. Those energy technologies are far more likely to come from major public investments than the private market, with or without a carbon-pricing scheme. “Our argument is,” Nordhaus said, “do some regulations here and there as you like, but the main event here is actually investing in the technologies, in developing the technologies that we need — that is a public good. It is the central challenge. And if we are not, sort of, centrally focused on that, we're not going to make much progress on the problem.”

### Links to Politics

#### Causes GOP backlash and kills the economy

Bank 1/7 – director of D.C. operations for the Alliance for Wise Energy Decisions (Dave, “Activist Groups Continue Uphill Battle to Impose Carbon Tax”, <http://news.heartland.org/newspaper-article/2013/01/07/activist-groups-continue-uphill-battle-impose-carbon-tax>, CMR)

Environmental activist groups are ramping up efforts to recruit liberal Republicans to promote a national carbon tax. Although activists say the tax is necessary to stave off global warming, Republicans so far are not buying such claims.¶ Meetings Discuss Strategy¶ Resources for the Future, the Union of Concerned Scientists, Clean Air Cool Planet, and Al Gore’s Climate Reality Project have held closed-door meetings to strategize about picking off liberal Republicans. In November, the coalition moved forward with its first public event, focusing on the domestic and international economics of a carbon tax. ¶ Punishing the Economy¶ Economists, however, point out a carbon tax would punish the economy and reduce living standards.“A carbon tax disproportionately hurts Americans hit hardest by Obama’s floundering economy—the poor,” said Chris Prandoni, federal affairs manager at Americans for Tax Reform. “With a higher percentage of poor and middle-class income dedicated to energy costs, a carbon tax quickly eats away at Americans’ disposable income.”

#### Even a revenue neutral carbon tax links to politics – recent vote proves and non-uniques your disad

Geman 3/22

[Ben, The Hill, “Carbon taxes spurned in Senate budget vote”, http://thehill.com/blogs/e2-wire/e2-wire/289945-carbon-taxes-spurned-in-senate-budget-vote]

The Senate went on record against imposing taxes on industrial carbon emissions in a pair of symbolic votes Friday, providing clear evidence that major climate change legislation lacks political traction. Lawmakers voted 41-58 to reject Sen. Sheldon Whitehouse’s (D-R.I.) proposal to ensure that revenue from any carbon tax be returned to the U.S. public through deficit reduction, reducing other rates and other “direct” benefits. Thirteen Democrats joined 45 Republicans opposing the Whitehouse amendment to the nonbinding budget plan, including some Democrats facing reelection in 2014 such as Sens. Max Baucus (Mont.), Mark Pryor (Ark.) and Mark Warner (Va.). The Whitehouse amendment went head-to-head with Sen. Roy Blunt’s (R-Mo.) anti-carbon tax amendment to ensure that any future carbon tax legislation requires 60 votes to pass. Blunt’s amendment drew a procedural protest that itself would have required 60 votes to overcome, and only got 53 “yes” votes — a majority, but not enough. He drew eight centrist Democrats to his side. The votes on the nonbinding budget resolutions were largely symbolic, and didn’t quite tackle the idea of taxing carbon emissions head-on or address specific proposals on emissions fees. But they nonetheless illustrated that Republicans and centrist Democrats appear to form a clear majority against fees on emissions from oil and coal producers, power plants and other sources.

#### Both sides oppose – recent vote proves

Hooper 3/23

[Molly, The Hill, “Gore: Pro-carbon tax editorial a ‘must-read’”, http://thehill.com/blogs/e2-wire/e2-wire/290027-gore-pro-carbon-tax-editorial-a-must-read]

The board took issue with what it deemed an unsubstantiated claim recently by more than 80 Republicans lawmakers that "carbon taxes would 'kill millions more jobs,' " saying those lawmakers have "no evidence to support it." The editorial board noted "carbon taxes have their drawbacks, it is true, but their problems are mostly fixable. They are regressive, but that could be offset by changes to other taxes. They can create difficulties for energy-intensive sectors, but those could be eased with targeted reliefs." The Senate killed an amendment, 41-58, to the budget resolution on Friday that would have ensured that revenue from any carbon tax be returned to the U.S. public through deficit reduction, reducing other rates and other “direct” benefits. Thirteen Democrats joined 45 Republicans opposing a proposal offered by Sen. Sheldon Whitehouse’s (D-R.I.), including some Democrats facing reelection in 2014 such as Sens. Max Baucus (Mont.), Mark Pryor (Ark.) and Mark Warner (Va.). On climate, the White House has said it will not propose a carbon tax to Congress.

### Warming Turns

**Turn: CP causes carbon leakage – results in more warming**

**Morgan ’12** – Vice President for Domestic and Economic Policy at The Heritage Foundation (Derrick, “A Carbon Tax Would Harm U.S. Competitiveness and Low-Income Americans Without Helping the Environment”, Aug 21, <http://www.heritage.org/research/reports/2012/08/a-carbon-tax-would-harm-us-competitiveness-and-low-income-americans-without-helping-the-environment>, CMR)

Even if one assumes that rising levels of carbon dioxide in the atmosphere lead to higher global temperatures, a carbon tax in the United States that reduces emissions domestically would have zero direct effect on foreign emissions if we acted alone. In fact, unilateral action by the U.S. would have very little effect on total global emissions. ¶ The EPA analyzed a cap-and-trade proposal and projected global CO2 concentrations in a baseline and under legislation, demonstrating the effects graphically.[16] (See Chart 1.) The Administrator of the EPA testified on July 7, 2009: “I believe the central parts of the [EPA] chart are that U.S. action alone will not impact world CO2 levels….”[17] The analysis showed that even if the U.S. adopted stringent carbon caps under that legislation[18] and the international community did not, global CO2 concentrations would decrease 25 parts per million (with concentrations equaling 694 ppm in 2095). International action, by contrast, would decrease concentrations by 202 ppm.¶ Just as in a unilateral U.S. cap-and-trade system, a unilateral U.S. carbon tax would likely further increase foreign emissions because of a phenomenon called “carbon leakage.” As energy-intensive industry relocates from the United States to other nations such as Mexico, Vietnam, or China (already the world’s largest emitter of greenhouse gases), GHG emissions and toxic pollutants could increase more than they would if those industries remained in the United States.[19]¶ Unilateral action by the United States to tax carbon emissions is unwise because it would not achieve its stated environmental goal: material reduction of global GHG emissions.

#### Carbon tax fails – increase reliance on coal in developing countries and prevents adoption of clean tech

AFP, 9/24/12 (Agence France-Presse, “Carbon tax calls risk global economy, experts warn”, National Affairs, http://www.theaustralian.com.au/national-affairs/carbon-tax/carbon-tax-calls-risk-global-economy-experts-warn/story-fndttws1-1226479992448http://www.theaustralian.com.au/national-affairs/carbon-tax/carbon-tax-calls-risk-global-economy-experts-warn/story-fndttws1-1226479992448)

CALLS for carbon taxes to tackle global warming often dodge the complexity of this issue, with the risk that hasty action could damage the world economy and fuel the greenhouse-gas problem, experts have warned.¶ Carbon taxes - levies that would be imposed on goods according to the carbon dioxide emitted in making them and shipping them - have been proposed by some as a way of curbing warming gases.¶ The idea is furiously opposed by developing giants, especially China, the world's No.1 manufacturer and carbon emitter by volume.¶ In a study published in the journal Nature Climate Change, German specialists caution the question is complex and a potential minefield.¶ "Typically in the West, we import goods whose production causes a lot of greenhouse-gas emissions in poorer countries," said Michael Jakob of the Potsdam Institute for Climate Impact Research (PIK).¶ "It is a contested question to which countries these emissions should be attributed."¶ In a 2010 study, imports to the United States were shown to contain on average 777 grams of carbon dioxide per dollar.¶ Exports from America, though, were far less carbon-intensive, at 490 grams of CO2 per dollar.¶ The picture for China, though, was quite the opposite: its imports were just 49 grams per dollar, but its exports were a whopping 2180 grams per dollar.¶ But these raw facts are misleading for several reasons, says the study.¶ For one thing, China's higher CO2 output is caused in part by demand for its goods in the United States, which is running a huge trade deficit.¶ "We can show that of the CO2 flowing into the US in (the) form of imported goods, almost 50 per cent are due to the American trade deficit alone," said Mr Jakob.¶ Other confounding factors are the economic role taken by developing countries, which are "relatively more specialised in the production of dirty goods", and also energy efficiency, says the paper.¶ A typical export from Western countries to developing giants is machine tools, which are then used to make products such as toys.¶ These machines are made in the West using comparatively low-carbon industrial techniques.¶ But when they are plugged in and used, they are usually powered by coal-fired electricity, the dirtiest of the main fossil fuels.¶ In such conditions, a carbon tax would be counter-productive.¶ To do so could prompt the developing country to make its own machines, which are likely to be more energy-intensive. This in turn would drive up the carbon tax on what was manufactured.¶ "In the end, interventions in world trade could do more harm than good," said co-author Robert Marschinski.¶ CO2 transfers alone "are not enough as a basis" to justify carbon taxes, he said.¶ What really counts is how clean or dirty national energy production is, he said.¶ Taxes "cannot replace what it really takes - more international co-operation" to set a goal for curbing carbon emissions, supplemented by help for greater energy efficiency and regional emissions-trading systems, he said.

**a.) Kills the economy**

**Loris ‘9** (Nicloas, “A Carbon Tax Is An Economy Killer, Too”, May 14, <http://blog.heritage.org/2009/05/14/a-carbon-tax-is-an-economy-killer-too/>, CMR)

In response to the Waxman-Markey cap and trade bill to reduce carbon dioxide and other greenhouse gas emissions, GOP lawmakers Bob Inglis of South Carolina and Jeff Flake of Arizona are set to introduce carbon tax legislation.¶ A carbon tax is a direct, more predictable tax on carbon emissions, but that does not make it any more acceptable. Proponents argue that it is better than a cap and trade because it will not unpredictably fluctuate with the ebbs and flows of the market as evidenced by Europe’s carbon trading problems.¶ Regardless of the efficiency of a carbon tax, any tax to reduce carbon dioxide similar to those proposed in cap and trade would cause **significant economic damage** and would do **very little** to reduce global temperatures. Furthermore, the economic pain of higher energy prices will reduce disposable income for other goods and services. Once the economy expands, bureaucrats would likely raise the tax on businesses, which would ultimately be passed on to the consumer.¶ As with a cap and trade bill, America’s poorest would be hit the hardest. Congress would likely tinker with income tax policy further, making it even more regressive to compensate while increasing the overall burden on Americans in the same way Europe has tinkered with its systems to compensate for the regressive effects of its insidious value-added tax.¶ Many proponents of a carbon tax emphasize that the economic burden would be less if the plan were coupled with a reduction in the capital gains tax or the payroll tax. Although cutting taxes further would encourage entrepreneurial activity and investment in labor and capital, this would do little to offset the high energy prices that fall particularly hard on low-income households. Higher energy prices would reduce economic activity by forcing businesses to cut costs elsewhere, possibly by reducing their workforce. Regardless of how policymakers implement a national energy tax, it is inherently flawed.

**b.) That takes out solvency for warming**

**Haass 8**

Richard. President of the Council on Foreign Relations. 11/8/8. <http://online.wsj.com/article/SB122611110847810599.html>.

**There will be other policy consequences of recession. It will be more difficult to negotiate an accord on climate change as countries such as China and India will resist anything that could be an impediment to growth**. High unemployment will make it even tougher to build a majority here at home for immigration reform. **We will likely see new outbreaks of resistance** to the ability of foreigners to buy U.S. assets despite a clear need for their dollars.

**7. Causes a trade war**

**Morgan ’12** – Vice President for Domestic and Economic Policy at The Heritage Foundation (Derrick, “A Carbon Tax Would Harm U.S. Competitiveness and Low-Income Americans Without Helping the Environment”, Aug 21, <http://www.heritage.org/research/reports/2012/08/a-carbon-tax-would-harm-us-competitiveness-and-low-income-americans-without-helping-the-environment>, CMR)

While proponents of a carbon tax explain that they could impose an adjustment tax on goods from countries without a carbon tax to help level the playing field, such an action could precipitate a **trade war**. Moreover, it would place U.S. manufacturers that export from the United States to other markets at a disadvantage when compared to manufacturers that produce in nations without GHG controls.

# No War

### Frontline

#### Counterforce targeting checks

Mueller 2009

(John, Woody Hayes Chair of National Security Studies and Professor of Political Science at Ohio State University. “Atomic Obsession: Nuclear Alarmism from Hiroshima to Al-Qaeda” p. 8)

To begin to approach a condition that can credibly justify applying such extreme characterizations as societal annihilation, a full-out attack with hundreds, probably thousands, of thermonuclear bombs would be required. Even in such extreme cases, the area actually devastated by the bombs' blast and thermal pulse effects would be limited: 2,000 I-MT explosions with a destructive radius of 5 miles each would directly demolish less than 5 percent of the territory of the United States, for example. Obviously, if major population centers were targeted, this sort of attack could inflict massive casualties. Back in cold war days, when such devastating events sometimes seemed uncomfortably likely, a number of studies were conducted to estimate the consequences of massive thermonuclear attacks. One of the most prominent of these considered several possibilities. The most likely scenario--one that could be perhaps be considered at least to begin to approach the rational-was a "counterforce" strike in which well over 1,000 thermonuclear weapons would be targeted at America's ballistic missile silos, strategic airfields, and nuclear submarine bases in an effort to destroy the country's strategic ability to retaliate. Since the attack would not directly target population centers, most of the ensuing deaths would be from radioactive fallout, and the study estimates that from 2 to 20 million, depending mostly on wind, weather, and sheltering, would perish during the first month.

#### Err aff on probability – risks of major war are almost ZERO

Fettweis 2006

[Christopher, National Security Decision Making Department, US Naval War College, “A Revolution in International Relation Theory: Or, What If Mueller Is Right?” International Studies Review (2006) 8, 677–697]

The obsolescence-of-major-war argument is familiar enough to need little introduction (Mueller 1989, 1995, 2004; see also Rosecrance 1986, 1999; Ray 1989; Kaysen 1990; Van Evera 1990–1991; Kegley 1993; Jervis 2002; Mandelbaum 2002). In its most basic and common form, the thesis holds that **a broad shift in attitudes toward warfare has occurred within the most powerful states of the international system, virtually removing the possibility for the kind of war that pits the strongest states against each other. Major wars**, fought by the most powerful members of the international system, **are**, in Michael Mandelbaum's (1998/1999:20) words, "somewhere between impossible and unlikely."  The argument is founded upon a traditional liberal faith in the possibility of moral progress within the society of great powers, which has created for the first time "an almost universal sense that the deliberate launching of a war can no longer be justified" (Ray 1989:425; also Luard 1986, 1989). To use Francis Fukayama's (1992) phrase**, it is the "autonomous power of ideas" that has brought major war to an end. Whereas past leaders were at times compelled by the masses to use force in the defense of the national honor, today popular pressures urge peaceful resolutions to disputes between industrialized states. This normative shift has all but removed warfare from the set of options before policymakers, making it a** highly unlikely outcome. Mueller (1989:11) has referred to the abolition of slavery and dueling as precedents. "Dueling, a form of violence famed and fabled for centuries, is avoided not merely because it has ceased to seem 'necessary,' but because it has sunk from thought as a viable, conscious possibility. You can't fight a duel if the idea of doing so never occurs to you or your opponent." By extension, states cannot fight wars if doing so does not occur to them or to their opponent. Major war has become, in Mueller's words, "sub-rationally unthinkable."  Obviously, the obsolescence-of-major-war argument is not without critics. First, and most basic, the literature is sometimes quite vague about what constitutes a "major war" and who exactly the "great powers" are. In Retreat from Doomsday, Mueller (1989) alternately describes his data set as consisting of "developed countries" (p. 4), the "first and second worlds" (p. 256), the "major and not-so-major countries" (p. 5), and the 44 wealthiest states (p. 252). Others refer to the great powers as those states with a certain minimum standard of living, especially those in Europe (Luard 1986:398); modern, "industrial societies" (Kaysen 1990); the "leading global powers" (Väyrynen 2006:13); or merely "the most powerful members of the international system" (Mandelbaum 1998/1999:21). What constitutes a "major" war is also often left unclear. Some analyses use arbitrary quantitative values (for example, 1,000 battle deaths); others study only world wars, those fought by the most powerful members of the international system, drawing on all their resources, with the potential to lead to outcomes of "revolutionary geopolitical consequences including the birth and death of regimes, the redrawing of borders, and the reordering of the hierarchy of sovereign states" (Mandelbaum 1998/1999:20).  **Definitions are often the last refuge of academic scoundrels—many IR theories deal with potentially contradictory information by simply refining or redefining the data under consideration. Perhaps the best way to avoid this pitfall is to err on the side of inclusion, expanding the analysis as broadly as possible. While the obsolescence-of-major-war argument clearly covers the kind of catastrophic wars that Mandelbaum analyzes, any big war between industrialized, powerful states would render the proposition false. At its essence, like pornography, one knows major war when one sees it.** Major powers will likely occasionally deem it in their interest to strike the minor, and at times small, states, especially those led by nondemocratic, unenlightened leaders. **But societal unease at the continuation of small wars—such as those in Afghanistan and Iraq or between poor, weak states like Ethiopia and Eritrea—should be ameliorated by the knowledge that, for the first time in history, world war is exceedingly unlikely**. Determining which states are great powers is slightly more complicated, but not by much. Two decades ago, Jack Levy (1983:10) noted that the importance of the concept of "great power" was not matched by anything approaching analytical precision in its use and the field has not progressed much since. Relevant states for this analysis are those with the potential to be great powers, whether that potential is realized or not. The choice not to devote a large portion of one's national resources toward territorial defense was not available to most states in other, bygone eras. If today's rich states can choose not to prepare for war without consequence, then the nature of the system may well have changed.  Broadly speaking, there is an indirect relationship between the relative level of development and the chances of being involved in a major war against a peer. In its most basic, inclusive, and falsifiable form, the obsolescence-of-major-war argument postulates that the most advanced countries—roughly speaking, those in the global north—are unlikely to fight one another ever again. Precise determination of which countries are in the "north" and which are not is less important than it may seem at first, since current versions of the argument do not restrict themselves to the great powers. As will be discussed below, if the logic behind the obsolescence-of-major-war argument is correct, a drastic diminution of all kinds of war everywhere may be on the horizon. It is important to note that this argument does not suggest that competition is coming to a conclusion, only that the means to compete have changed. Rivalry will continue; envy, hubris, and lust for power will likely never disappear. Rogues and outlaws will probably always plague humanity, but very rarely as leaders of powerful states, especially in the northern democracies. **The Mueller argument merely holds that** war need not follow from any of this, **especially major wars**. States can compete in nonviolent ways, addressing the logic of war with the grammar of commerce, to paraphrase Edward Luttwak (1990:19). The conflicts of the future may be fought in boardrooms rather than battlefields, using diplomacy, sanctions, and the methods of commerce rather than brute force.  One of the obvious strengths of the obsolescence-of-major-war argument is that it carries clear routes to falsification. It can be proven incorrect by virtually any big war in Western Europe, in the Pacific Rim, or in North America. If Japan attacks Australia, if the United States moves north, or if Germany rises again and makes another thrust at Paris and Moscow, Retreat from Doomsday will join The Great Illusion (Angell [1909] 1913) in the skeptical realist's list of utopian fantasies. Until that happens, however, scholars are left to explain one of the great anomalies in the history of the international system.  Most IR scholarship carries on as if such an anomaly simply does not exist. This is especially true of realists, whose theories typically leave little room for fundamental systemic change (Lebow 1994). "The game of politics does not change from age to age," argued a skeptical Colin Gray (1999:163), "let alone from decade to decade." Indeed, the most powerful counterargument to Mueller—and one that is ultimately unanswerable—is that this period of peace will be temporary and that someday these trends will be reversed. Neorealists traditionally contend that the anarchic structure of the system stacks the deck against long-term stability, which accounts for "war's dismal recurrence throughout the millennia," in the words of Kenneth Waltz (1989:44). Other scholars are skeptical about the explanatory power of ideas, at least as independent variables in models of state behavior (Mearsheimer 1994/1995; Brooks and Wohlforth 2000/2001; Copeland 2003).  However, one need not be convinced about the potential for ideas to transform international politics to believe that major war is extremely unlikely to recur. Mueller, Mandelbaum, Ray, and others may give primary credit for the end of major war to ideational evolution akin to that which made slavery and dueling obsolete, but others have interpreted the causal chain quite differently. Neoliberal institutionalists have long argued that complex economic interdependence can have a pacifying effect upon state behavior (Keohane and Nye 1977, 1987). Richard Rosecrance (1986, 1999) has contended that evolution in socio-economic organization has altered **the shortest, most rational route to state prosperity** in ways that **make war unlikely.** Finally, many others have argued that credit for great power peace can be given to the existence of nuclear weapons, which make aggression irrational (Jervis 1989; Kagan et al. 1999). With so many overlapping and mutually reinforcing explanations, at times the end of major war may seem to be overdetermined (Jervis 2002:8–9). For purposes of the present discussion, successful identification of the exact cause of this fundamental change in state behavior is probably not as important as belief in its existence. In other words, the outcome is far more important than the mechanism. The importance of Mueller's argument for the field of IR is ultimately not dependent upon why major war has become obsolete, only that it has.  Almost as significant, all these proposed explanations have one important point in common: they all imply that change will be permanent. Normative/ideational evolution is typically unidirectional—few would argue that it is likely, for instance, for slavery or dueling to return in this century. The complexity of economic interdependence is deepening as time goes on and going at a quicker pace. And, obviously, nuclear weapons cannot be uninvented and (at least at this point) no foolproof defense against their use seems to be on the horizon. The combination of forces that may have brought major war to an end seems to be unlikely to allow its return.  **The twentieth century witnessed an unprecedented pace of evolution in all areas of human endeavor, from science and medicine to philosophy and religion. In such an atmosphere, it is not difficult to imagine that attitudes toward the venerable institution of war may also have experienced rapid evolution and that its obsolescence could become plausible, perhaps even probable, in spite of thousands of years of violent precedent. The** burden of proof **would seem to be on those who maintain that the "rules of the game" of international politics, including the rules of war, are the lone area of human interaction immune to fundamental evolution and that, due to these immutable and eternal rules, war will always be with us. Rather than ask how major war could have grown obsolete, perhaps scholars should ask why anyone should believe that it could not.**

#### Miscalc is impossible

Quinlan 2009

(Sir Michael, visiting professor at King's College London, Permanent Under-Secretary at the Ministry of Defence and former senior fellow at the International Institute of Strategic Studies, “Thinking About Nuclear Weapons: Principles, Problems, Prospects,” Oxford University Press, CMR)

One special form of miscalculation appeared sporadically in the speculations of academic commentators, though it was scarcely ever to be encountered—at least so far as my own observation went—in the utterances of practical planners within government. This is the idea that nuclear war might be erroneously triggered, or erroneously widened, through a state under attack misreading either what sort of attack it was being subjected to, or where the attack came from. The postulated misreading of the nature of the attack referred in particular to the hypothesis that if a delivery system—normally a missile—that was known to be capable of carrying either a nuclear or a conventional warhead was launched in a conventional role, the target country might, on detecting the launch through its early warning systems, misconstrue the mission as an imminent nuclear strike and immediately unleash a nuclear counter-strike of its own. This conjecture was voiced, for example, as a criticism of the proposals for giving the US Trident SLBM, long associated with nuclear missions, a capability to deliver conventional warheads. Whatever the merit of those proposals (it is not explored here), it is hard to regard this particular apprehension as having any real-life credibility. The ﬂight time of a ballistic missile would not exceed about thirty minutes, and that of a cruise missile a few hours, before arrival on target made its character—conventional or nuclear—unmistakable. No government will need, and no nonlunatic government could wish, to take within so short a span of time a step as enormous and irrevocable as the execution of a nuclear strike on the basis of early-warning information alone without knowing the true nature of the incoming attack. The speculation tends moreover to be expressed without reference either to any realistic political or conﬂict-related context thought to render the episode plausible, or to the manifest interest of the launching country, should there be any risk of doubt, in ensuring—by explicit communication if necessary—that there was no misinterpretation of its conventionally armed launch.

**No nuke winter - studies**

Seitz 2011

(Russell, Harvard University Center for International Affairs visiting scholar, “Nuclear winter was and is debatable,” Nature, 7-7-11, Vol 475, pg37, accessed 9-27-11, CMR)

Alan Robock's contention that there has been no real scientific debate about the 'nuclear winter' concept is itself **debatable** (Nature 473, 275–276; 2011). This potential climate disaster, popularized in Science in 1983, rested on the output of a one-dimensional model that was later shown to overestimate the smoke a nuclear holocaust might engender. More refined estimates, combined with advanced three-dimensional models (see http://go.nature.com.libproxy.utdallas.edu/kss8te), have dramatically reduced the extent and severity of the projected cooling. Despite this, Carl Sagan, who co-authored the 1983 Science paper, went so far as to posit “the extinction of Homo sapiens” (C. Sagan Foreign Affairs 63, 75–77; 1984). Some regarded this apocalyptic prediction as **an exercise in mythology**. George Rathjens of the Massachusetts Institute of Technology protested: “Nuclear winter is **the worst example of the misrepresentation of science to the public in my memory**,” (see http://go.nature.com.libproxy.utdallas.edu/yujz84) and climatologist Kerry Emanuel observed that the subject had “become **notorious for its lack of scientific integrity”** (Nature 319, 259; 1986). Robock's single-digit fall in temperature is at odds with the subzero (about −25 °C) continental cooling originally projected for a wide spectrum of nuclear wars. Whereas Sagan predicted darkness at noon from a US–Soviet nuclear conflict, Robock projects global sunlight that is several orders of magnitude brighter for a Pakistan–India conflict — literally the difference between night and day. Since 1983, the projected worst-case cooling has fallen from a Siberian deep freeze spanning 11,000 degree-days Celsius (a measure of the severity of winters) to numbers so unseasonably small as to call the very term 'nuclear winter' into question.

#### Counterforce targeting checks

Mueller 2009

(John, Woody Hayes Chair of National Security Studies and Professor of Political Science at Ohio State University. “Atomic Obsession: Nuclear Alarmism from Hiroshima to Al-Qaeda” p. 8)

To begin to approach a condition that can credibly justify applying such extreme characterizations as societal annihilation, a full-out attack with hundreds, probably thousands, of thermonuclear bombs would be required. Even in such extreme cases, the area actually devastated by the bombs' blast and thermal pulse effects would be limited: 2,000 I-MT explosions with a destructive radius of 5 miles each would directly demolish less than 5 percent of the territory of the United States, for example. Obviously, if major population centers were targeted, this sort of attack could inflict massive casualties. Back in cold war days, when such devastating events sometimes seemed uncomfortably likely, a number of studies were conducted to estimate the consequences of massive thermonuclear attacks. One of the most prominent of these considered several possibilities. The most likely scenario--one that could be perhaps be considered at least to begin to approach the rational-was a "counterforce" strike in which well over 1,000 thermonuclear weapons would be targeted at America's ballistic missile silos, strategic airfields, and nuclear submarine bases in an effort to destroy the country's strategic ability to retaliate. Since the attack would not directly target population centers, most of the ensuing deaths would be from radioactive fallout, and the study estimates that from 2 to 20 million, depending mostly on wind, weather, and sheltering, would perish during the first month.

**Intervening actions check escalation**

Trachtenberg 2000

(Prof of History, Pennsylvania (Marc, The "Accidental War" Question, http://www.sscnet.ucla.edu/polisci/faculty/trachtenberg/cv/inadv(1).pdf, CMR)

The second point has to do with how much risk there really is in situations of this sort. It should not be assumed too readily that states underestimate the degree to which they lose control of the situation when they engage in a crisis. States can generally **pull back from the brink** if they really want to; prestige will be sacrificed, but often states are willing to pay that price. The history of international politics in the century that just ended is **full of crises** that were liquidated by one side accepting what amounted to defeat, sometimes even humiliating defeat; and in the July Crisis in 1914, the German government chose at the most critical moment to let the war come rather than press for a compromise solution.9 The key thing here is that in 1914 and 1939 political leaders had not totally lost control, but had chosen to accept war rather than back off in a crisis. Their aversion to war was not overwhelming. But when both sides very much want to avoid a full-scale armed conflict, the story is very different. This was the case during the Cold War. People sometimes seem to assume that peace was hanging by a thread during that conflict, and that we were lucky to make our way through it without a thermonuclear holocaust. But I don't think this is true at all: and in general I think it is **very unlikely** that a great war would break out if both sides are determined to avoid it. These arguments about how war could break out almost by accident were frequently made during the Cold War itself--and indeed were made by responsible and experie nced officials. A British document from March 1946, for example, argued that the Soviets did not want war, but the kind of tactics they used with the West might lead to a war that neither side wanted: "although the intention may be defensive, the tactics will be offensive, and the danger always exists that Russian leaders may misjudge how far they can go without provoking war with American or ourselves."10 A year later, a British Foreign Office official warned that the fact that the Soviets had military superiority in Europe might make them careless, and that they might "misjudge what measures can safely be taken without producing a serious crisis." Events might get out of control and a situation might develop that could "lead to disaster."11 What is wrong with this point of view? It assumes that the Soviets would not be cautious, that they would not frame their actions very carefully with an eye to the American reaction, that in deciding how far to go they would not gauge very closely how the Americans reacted to the measures they had taken up to that point. This point of view assumes also that the Soviets would find it very hard to draw back if it became clear that they had overstepped the bounds and had thought the American reaction would not be as vigorous as it in fact was--or indeed that they had not made the mental reservation that they could draw back, in necessary, when they decided to embark on a provocative course of action. Basically the assumption is that the Soviets did not care enough about what a war would entail to take these rather elementary and normal precautions. This point of view also assumes that the American response would be very rigid and "spring-loaded": a slight Soviet infringement, and the Americans immediately take the plunge into general war--as though there are no intermediate measures of a political or military nature that would be taken, no process that would unfold within which the two sides would test each other out before resorting to extreme measures. To my mind, anyone with any sense should know that things would **never** move directly and mechanically from initial provocation to full-scale war, that things would unfold almost inevitably in a more complex way--or, in short, that enough "**cushioning**" exists in the system to keep relatively minor provocations from leading directly to general war.

#### Uncertainty is a reason to vote aff – our ability to predict exactly what will happen and adapt is minimal

Kim, 2012 (Dr. Jim Yong, President of the World Bank Group, “Turn Down The heat: why a 4°C warmer world must be avoided”, November, World Bank, http://climatechange.worldbank.org/sites/default/files/Turn\_Down\_the\_heat\_Why\_a\_4\_degree\_centrigrade\_warmer\_world\_must\_be\_avoided.pdf)

It is my hope that this report shocks us into action. Even for those of us already committed to fighting climate change, I hope it causes us to work with much more urgency. This report spells out what the world would be like if it warmed by 4 degrees Celsius, which is what scientists are nearly unanimously predicting by the end of the century, without serious policy changes. The 4°C scenarios are devastating: the inundation of coastal cities; increasing risks for food production potentially leading to higher malnutrition rates; many dry regions becoming dryer, wet regions wetter; unprecedented heat waves in many regions, especially in the tropics; substantially exacerbated water scarcity in many regions; increased frequency of high-intensity tropical cyclones; and irreversible loss of biodiversity, including coral reef systems. And most importantly, a 4°C world is so different from the current one that it comes with high uncertainty and new risks that threaten our ability to anticipate and plan for future adaptation needs. The lack of action on climate change not only risks putting prosperity out of reach of millions of people in the developing world, it threatens to roll back decades of sustainable development. It is clear that we already know a great deal about the threat before us. The science is unequivocal that humans are the cause of global warming, and major changes are already being observed: global mean warming is 0.8°C above pre industrial levels; oceans have warmed by 0.09°C since the 1950s and are acidifying; sea levels rose by about 20 cm since pre-industrial times and are now rising at 3.2 cm per decade; an exceptional number of extreme heat waves occurred in the last decade; major food crop growing areas are increasingly affected by drought. Despite the global community’s best intentions to keep global warming below a 2°C increase above pre-industrial climate, higher levels of warming are increasingly likely. Scientists agree that countries’ current United Nations Framework Convention on Climate Change emission pledges and commitments would most likely result in 3.5 to 4°C warming. And the longer those pledges remain unmet, the more likely a 4°C world becomes. Data and evidence drive the work of the World Bank Group. Science reports, including those produced by the Intergovernmental Panel on Climate Change, informed our decision to ramp up work on these issues, leading to, a World Development Report on climate change designed to improve our understanding of the implications of a warming planet; a Strategic Framework on Development and Climate Change, and a report on Inclusive Green Growth. The World Bank is a leading advocate for ambitious action on climate change, not only because it is a moral imperative, but because it makes good economic sense. But what if we fail to ramp up efforts on mitigation? What are the implications of a 4°C world? We commissioned this report from the Potsdam Institute for Climate Impact Research and Climate Analytics to help us understand the state of the science and the potential impact on development in such a world. It would be so dramatically different from today’s world that it is hard to describe accurately; much relies on complex projections and interpretations. We are well aware of the uncertainty that surrounds these scenarios and we know that different scholars and studies sometimes disagree on the degree of risk. But the fact that such scenarios cannot be discarded is sufficient to justify strengthening current climate change policies. Finding ways to avoid that scenario is vital for the health and welfare of communities around the world. While every region of the world will be affected, the poor and most vulnerable would be hit hardest. A 4°C world can, and must, be avoided. The World Bank Group will continue to be a strong advocate for international and regional agreements and increasing climate financing. We will redouble our efforts to support fast growing national initiatives to mitigate carbon emissions and build adaptive capacity as well as support inclusive green growth and climate smart development. Our work on inclusive green growth has shown that—through more efficiency and smarter use of energy and natural resources—many opportunities exist to drastically reduce the climate impact of development, without slowing down poverty alleviation and economic growth. This report is a stark reminder that climate change affects everything. The solutions don’t lie only in climate finance or climate projects. The solutions lie in effective risk management and ensuring all our work, all our thinking, is designed with the threat of a 4°C degree world in mind. The World Bank Group will step up to the challenge.

### No War - Deterrence

#### No nuclear war – deterrence

Tepperman 2009

[Jonathan, Deputy Editor at Newsweek. Frmr Deputy Managing Editor, Foreign Affairs. LLM, i-law, NYU. MA, jurisprudence, Oxford Why Obama Should Learn to Love the Bomb, <http://jonathantepperman.com/Welcome_files/nukes_Final.pdf>]

The argument that nuclear weapons can be agents of peace as well as destruction rests on two deceptively simple observations. First, nuclear weapons have not been used since 1945. Second, there’s never been a nuclear, or even a nonnuclear, war between two states that possess them. Just stop for a second and think about that: it’s hard to overstate how remarkable it is, especially given the singular viciousness of the 20th century. As Kenneth Waltz, the leading “nuclear optimist” and a professor emeritus of political science at UC Berkeley puts it, “We now have 64 years of experience since Hiroshima. It’s striking and against all historical precedent that for that substantial period, there has not been any war among nuclear states.” To understand why—and why the next 64 years are likely to play out the same way—you need to start by recognizing that all states are rational on some basic level. Their leaders may be stupid, petty, venal, even evil, but they tend to do things only when they’re pretty sure they can get away with them. Take war: a country will start a fight only when it’s almost certain it can get what it wants at an acceptable price. Not even Hitler or Saddam waged wars they didn’t think they could win. The problem historically has been that leaders often make the wrong gamble and underestimate the other side—and millions of innocents pay the price. Nuclear weapons change all that by making the costs of war obvious, inevitable, and unacceptable. Suddenly, when both sides have the ability to turn the other to ashes with the push of a button— and everybody knows it—the basic math shifts. Even the craziest tin-pot dictator is forced to accept that war with a nuclear state is unwinnable and thus not worth the effort. As Waltz puts it, “Why fight if you can’t win and might lose everything?” Why indeed? The iron logic of deterrence and mutually assured destruction is so compelling, it’s led to what’s known as the nuclear peace: the virtually unprecedented stretch since the end of World War II in which all the world’s major powers have avoided coming to blows. They did fight proxy wars, ranging from Korea to Vietnam to Angola to Latin America. But these never matched the furious destruction of full-on, great-power war (World War II alone was responsible for some 50 million to 70 million deaths). And since the end of the Cold War, such bloodshed has declined precipitously. Meanwhile, the nuclear powers have scrupulously avoided direct combat, and there’s very good reason to think they always will. There have been some near misses, but a close look at these cases is fundamentally reassuring—because in each instance, very different leaders all came to the same safe conclusion. Take the mother of all nuclear standoffs: the Cuban missile crisis. For 13 days in October 1962, the United States and the Soviet Union each threatened the other with destruction. But both countries soon stepped back from the brink when they recognized that a war would have meant curtains for everyone. As important as the fact that they did is the reason why: Soviet leader Nikita Khrushchev’s aide Fyodor Burlatsky said later on, “It is impossible to win a nuclear war, and both sides realized that, maybe for the first time.” The record since then shows the same pattern repeating: nuclear armed enemies slide toward war, then pull back, always for the same reasons. The best recent example is India and Pakistan, which fought three bloody wars after independence before acquiring their own nukes in 1998. Getting their hands on weapons of mass destruction didn’t do anything to lessen their animosity. But it did dramatically mellow their behavior. Since acquiring atomic weapons, the two sides have never fought another war, despite severe provocations (like Pakistani-based terrorist attacks on India in 2001 and 2008). They have skirmished once. But during that flare-up, in Kashmir in 1999, both countries were careful to keep the fighting limited and to avoid threatening the other’s vital interests. Sumit Ganguly, an Indiana University professor and coauthor of the forthcoming India, Pakistan, and the Bomb, has found that on both sides, officials’ thinking was strikingly similar to that of the Russians and Americans in 1962. The prospect of war brought Delhi and Islamabad face to face with a nuclear holocaust, and leaders in each country did what they had to do to avoid it.

#### Taboo is too strong – all of their scenarios are wrong

Perkovich 2009

George Perkovich, International Commission on Nuclear Non-proliferation and Disarmament, May 2009, “Extended Deterrence On The Way To A Nuclear Free World,” International Commission on Nuclear Non-proliferation and Disarmament,

The reality today is that the taboo against using nuclear weapons has become so strong, especially in democracies, that the only threat against which it is justifiable and therefore credible to use these weapons is one where the survival of the U.S. or an ally is clearly jeopardized. Yet, with the possible exception of North Korea whose leadership could be imagined to use nuclear weapons against Japan or South Korea if its own survival were threatened, no other state poses a realistic threat to the national survival of U.S. allies in Europe or East Asia. Russia does not have the intention or capability to sustain an invasion of the new NATO states, let alone threaten their survival. Russia could destroy any state with its nuclear weapons, but because this, more than any other action, would practically guarantee nuclear retaliation, Russia would not run the risk. There is simply nothing important enough that Russia would want in any of the NATO states to merit such risk taking. China has no interest and inadequate capabilities to take mainland Japanese territory or otherwise threaten it militarily. It might pose military threats to Japanese positions regarding southern islands, but the U.S. and China are not going to wage nuclear war over such islands, and Japanese officials and public cannot realistically expect nuclear deterrence to operate here. Beijing does continue to increase its capabilities to deter Taiwan from declaring independence and the U.S. from defending Taiwan in such a scenario, but the surety of U.S. security assurances to Taiwan would be greater, not less, if neither China nor the U.S. possessed nuclear weapons. For the foreseeable future China would be highly unlikely to use nuclear weapons on Taiwanese targets, as the Chinese goal is to integrate Taiwanese into China, not to kill them. China would wish to deter U.S. intervention by threatening the American fleet, perhaps with nuclear weapons, and then deterring U.S. escalation against the Chinese homeland, by holding U.S. cities at risk. But the trigger of nuclear use in these scenarios would be a move by Taiwan to achieve independence. The U.S. has no obligation to fight for Taiwanese independence if China has not committed aggression against Taiwan first.

### No War - Interdependence

#### Interdependence checks

Deudney 2009

[Daniel and John, Prof of Pol Sci at John Hopkins and Prof of International Affairs at Princeton, “Why Liberal Democracy Will Prevail” <http://www.nwc.navy.mil/events/csf/readings/AutocraticRevival.aspx>)

This bleak outlook is based on an exaggeration of recent developments and ignores powerful countervailing factors and forces. Indeed, contrary to what the revivalists describe, the most striking features of the contemporary international landscape are the intensification of economic globalization, thickening institutions, and shared problems of interdependence. The overall structure of the international system today is quite unlike that of the nineteenth century. Compared to older orders, the contemporary liberal-centered international order provides a set of constraints and opportunities — of pushes and pulls — that reduce the likelihood of severe conflict while creating strong imperatives for cooperative problem solving. Those invoking the nineteenth century as a model for the twenty-first also fail to acknowledge the extent to which war as a path to conflict resolution and great-power expansion has become largely obsolete. Most important, nuclear weapons have transformed great-power war from a routine feature of international politics into an exercise in national suicide. With all of the great powers possessing nuclear weapons and ample means to rapidly expand their deterrent forces, warfare among these states has truly become an option of last resort. The prospect of such great losses has instilled in the great powers a level of caution and restraint that effectively precludes major revisionist efforts. Furthermore, the diffusion of small arms and the near universality of nationalism have severely limited the ability of great powers to conquer and occupy territory inhabited by resisting populations (as Algeria, Vietnam, Afghanistan, and now Iraq have demonstrated). Unlike during the days of empire building in the nineteenth century, states today cannot translate great asymmetries of power into effective territorial control; at most, they can hope for loose hegemonic relationships that require them to give something in return. Also unlike in the nineteenth century, today the density of trade, investment, and production networks across international borders raises even more the costs of war. A Chinese invasion of Taiwan, to take one of the most plausible cases of a future interstate war, would pose for the Chinese communist regime daunting economic costs, both domestic and international. Taken together, these changes in the economy of violence mean that the international system is far more primed for peace than the autocratic revivalists acknowledge.

#### No great power wars – shared interests

Gelb 2010

[Leslie, President Emeritus of the Council on Foreign Relations. He was a senior official in the U.S. Defense Department from 1967 to 1969 and in the State Department from 1977 to 1979 Foreign Affairs, “GDP Now Matters More Than Force: A U.S. Foreign Policy for the Age of Economic Power,” November/December, proquest]

Also reducing the likelihood of conflict today is that there is no arena in which the vital interests of great powers seriously clash. Indeed, the most worrisome security threats today -- rogue states with nuclear weapons and terrorists with weapons of mass destruction -- actually tend to unite the great powers more than divide them. In the past, and specifically during the first era of globalization, major powers would war over practically nothing. Back then, they fought over the Balkans, a region devoid of resources and geographic importance, a strategic zero. Today, they are unlikely to shoulder their arms over almost anything, even the highly strategic Middle East. All have much more to lose than to gain from turmoil in that region. To be sure, great powers such as China and Russia will tussle with one another for advantages, but they will stop well short of direct confrontation.

# No Nuclear Extinction

### Studies-Prove

**No nuke winter - studies**

Seitz 2011

[Russell, Harvard University Center for International Affairs visiting scholar, “Nuclear winter was and is debatable,” Nature, 7-7-11, Vol 475, pg37]

Alan Robock's contention that there has been no real scientific debate about the 'nuclear winter' concept is itself **debatable** (Nature 473, 275–276; 2011). This potential climate disaster, popularized in Science in 1983, rested on the output of a one-dimensional model that was later shown to overestimate the smoke a nuclear holocaust might engender. More refined estimates, combined with advanced three-dimensional models (see http://go.nature.com.libproxy.utdallas.edu/kss8te), have dramatically reduced the extent and severity of the projected cooling. Despite this, Carl Sagan, who co-authored the 1983 Science paper, went so far as to posit “the extinction of Homo sapiens” (C. Sagan Foreign Affairs 63, 75–77; 1984). Some regarded this apocalyptic prediction as **an exercise in mythology**. George Rathjens of the Massachusetts Institute of Technology protested: “Nuclear winter is **the worst example of the misrepresentation of science to the public in my memory**,” (see http://go.nature.com.libproxy.utdallas.edu/yujz84) and climatologist Kerry Emanuel observed that the subject had “become **notorious for its lack of scientific integrity”** (Nature 319, 259; 1986). Robock's single-digit fall in temperature is at odds with the subzero (about −25 °C) continental cooling originally projected for a wide spectrum of nuclear wars. Whereas Sagan predicted darkness at noon from a US–Soviet nuclear conflict, Robock projects global sunlight that is several orders of magnitude brighter for a Pakistan–India conflict — literally the difference between night and day. Since 1983, the projected worst-case cooling has fallen from a Siberian deep freeze spanning 11,000 degree-days Celsius (a measure of the severity of winters) to numbers so unseasonably small as to call the very term 'nuclear winter' into question.

### No Escelation

#### Even if a conflict begins, nuclear deterrence checks escalation.

Robinson 2001

[C. Paul, – President and Director, Sandia National Laboratories, PhD Physics @ FSU, Chair of the Policy Committee of the Strategic Advisory Group for the Commander, US Strategic Command, 3-22, “Pursuing a New Nuclear Weapons Policy for the 21st Century,” <http://www.sandia.gov/media/whitepaper/2001-04-Robinson.htm>]

Let me then state my most important conclusion directly: I believe nuclear weapons must have an abiding place in the international scene for the foreseeable future. I believe that the world, in fact, would become more dangerous, not less dangerous, were U.S. nuclear weapons to be absent. The most important role for our nuclear weapons is to serve as a “sobering force,” one that can cap the level of destruction of military conflicts and thus force all sides to come to their senses. This is the enduring purpose of U.S. nuclear weapons in the post-Cold War world. I regret that we have not yet captured such thinking in our public statements as to why the U.S. will retain nuclear deterrence as a cornerstone of our defense policy, and urge that we do so in the upcoming Nuclear Posture Review. Nuclear deterrence becomes in my view a “countervailing” force and, in fact, a potent antidote to military aggression on the part of nations. But to succeed in harnessing this power, effective nuclear weapons strategies and policies are necessary ingredients to help shape and maintain a stable and peaceful world.

### No Nuclear Winter

#### Nuclear war doesn’t cause extinction- bad physics

Seitz 200 6

(Russell, , Harvard University Center for International Affairs visiting scholar "The' Nuclear Winter ' Meltdown; Photoshopping the Apocalypse," adamant.typepad.com/seitz/2006/12/preherein\_honor.html)

The recent winter solstice witnessed a 'Carl Sagan Blog-a-thon' . So in celebration of Al Gore's pal, the late author of The Cold And The Dark there follows The Wall Street Journal's warmly cautionary Cold War reminder of how a campaign for the Nobel Peace prize on the Nuclear Freeze ticket devolved into a joke played at the expense of climate modeling's street cred on the eve of the global warming debate :The Melting of 'Nuclear Winter' All that remains of Sagan's Big Chill are curves such as this , Fig3tempprecip\_4\_2 but history is full of prophets of doom who fail to deliver, not all are without honor in their own land. The 1983 'Nuclear Winter " papers in Science were so politicized that even the eminently liberal President of The Council for a Liveable World called "The worst example ofthe misrepesentation of science to the public in my memory." Among the authors was Stanford President Donald Kennedy. Today he edits Science , the nation's major arbiter of climate science--and policy. Below, a case illustrating the mid-range of the ~.7 to ~1.6 degree C maximum cooling the 2006 studies suggest is superimposed in color on the Blackly Apocalyptic predictions published in Science Vol. 222, 1983 . They're worth comparing, because the range of soot concentrations in the new models overlaps with cases assumed to have dire climatic consequences in the widely publicized 1983 scenarios --Meltdownofttaps "Apocalyptic predictions require, to be taken seriously,higher standards of evidence than do assertions on other matters where the stakes are not as great." wrote Sagan in Foreign Affairs , Winter 1983 -84. But that "evidence" was never forthcoming. 'Nuclear Winter' never existed outside of a computer except as air-brushed animation commissioned by the a PR firm - Porter Novelli Inc. Yet Sagan predicted "the extinction of the human species " as temperatures plummeted 35 degrees C and the world froze in the aftermath of a nuclear holocaust. Last year, Sagan's cohort tried to reanimate the ghost in a machine anti-nuclear activists invoked in the depths of the Cold War, by re-running equally arbitrary scenarios on a modern interactive Global Circulation Model. But the Cold War is history in more ways than one. It is a credit to post-modern computer climate simulations that they do not reproduce the apocalyptic results of what Sagan oxymoronically termed "a sophisticated one dimensional model." The subzero 'baseline case' has melted down into a tepid 1.3 degrees of average cooling- grey skies do not a Ragnarok make. What remains is just not the stuff that End of the World myths are made of. It is hard to exaggerate how seriously " nuclear winter "was once taken by policy analysts who ought to have known better. Many were taken aback by the sheer force of Sagan's rhetoric Remarkably, Science's news coverage of the new results fails to graphically compare them with the old ones Editor Kennedy and other recent executives of the American Association for the Advancement of Science, once proudly co-authored and helped to publicize. You can't say they didn't try to reproduce this Cold War icon. Once again, soot from imaginaryPropaganda\_penguin\_1\_1 software materializes in midair by the megaton , flying higher than Mount Everest . This is not physics, but a crude exercise in ' garbage in, gospel out' parameter forcing designed to maximize and extend the cooling an aeosol can generate, by sparing it from realistic attrition by rainout in the lower atmosphere. Despite decades of progress in modeling atmospheric chemistry , there is none in this computer simulation, and ignoring photochemistry further extends its impact. Fortunately , the history of science is as hard to erase as it is easy to ignore. Their past mastery of semantic agression cannot spare the authors of "Nuclear Winter Lite " direct comparison of their new results and their old. Dark smoke clouds in the lower atmosphere don't last long enough to spread across the globe. Cloud droplets and rainfall remove them, rapidly washing them out of the sky in a matter of days to weeks- not long enough to sustain a global pall. Real world weather brings down particles much as soot is scrubbed out of power plant smoke by the water sprays in smoke stack scrubbers Robock acknowledges this- not even a single degree of cooling results when soot is released at lower elevations in he models . The workaround is to inject the imaginary aerosol at truly Himalayan elevations - pressure altitudes of 300 millibar and higher , where the computer model's vertical transport function modules pass it off to their even higher neighbors in the stratosphere , where it does not rain and particles linger.. The new studies like the old suffer from the disconnect between a desire to paint the sky black and the vicissitudes of natural history. As with many exercise in worst case models both at invoke rare phenomena as commonplace, claiming it prudent to assume the worst. But the real world is subject to Murphy's lesser known second law- if everything must go wrong, don't bet on it. In 2006 as in 1983 firestorms and forest fires that send smoke into the stratosphere rise to alien prominence in the modelers re-imagined world , but i the real one remains a very different place, where though every month sees forest fires burning areas the size of cities - 2,500 hectares or larger , stratospheric smoke injections arise but once in a blue moon. So how come these neo-nuclear winter models feature so much smoke so far aloft for so long? The answer is simple- the modelers intervened. Turning off vertical transport algorithms may make Al Gore happy- he has bet on reviving the credibility Sagan's ersatz apocalypse , but there is no denying that in some of these scenarios human desire, not physical forces accounts for the vertical hoisting of millions of tons of mass ten vertical kilometers into the sky.to the level at which the models take over , with results at once predictable --and arbitrary. This is not physics, it is computer gamesmanship carried over to a new generation of X-Box.

#### Concentration checks extinction- AND aff doesn’t turn the impact

**Tonn 2005**

[Bruce, UT political science professor, “Human extinction scenarios”, August, <http://www.budapestfutures.org/downloads/abstracts/Bruce%20Tonn%20-%20Abstract.pdf>]

The human species faces numerous threats to its existence. These include global climate change, collisions with near-earth objects, nuclear war, and pandemics. While these threats are indeed serious, taken separately they fail to describe exactly how humans could become extinct. For example, **nuclear war by itself would** most likely **fail to kill everyone on the planet**, as strikes would probably be **concentrated** in the northern hemisphere and the Middle East, leaving populations in South America, South Africa, Australia and New Zealand some hope of survival. It is highly unlikely that any uncontrollable nanotechnology could ever be produced but even it if were, it is likely that humans could develop effective, if costly, countermeasures, such as producing the technologies in space or destroying sites of runaway nanotechnologies with nuclear weapons. Viruses could indeed kill many people but effective quarantine of ‘healthy’ people could be accomplished to save large numbers of people. Humans appear to be resilient to extinction with respect to single events.

# Yes War

### Frontline

#### Great-power nuclear war’s possible

**Wittner 11** Lawrence Wittner is Professor of History emeritus at SUNY/Albany "Is a Nuclear War With China Possible?" 11/30/2011 [www.huffingtonpost.com/lawrence-wittner/nuclear-war-china\_b\_1116556.html](http://www.huffingtonpost.com/lawrence-wittner/nuclear-war-china_b_1116556.html)

While nuclear weapons exist, there remains a dangerthat **they will be used**. After all, for centuries national conflicts have led to wars, with nations employing **their deadliest weapons**. The current deterioration of U.S. relations with China might end up providing us with yet another example of this phenomenon. The gathering tension between the United States and China is clear enough. Disturbed by China’s growing economic and military strength, the U.S. government recently challenged China’s claims in the South China Sea, increased the U.S. military presence in Australia, and deepened U.S. military ties with other nations in the Pacific region. According to Secretary of State Hillary Clinton, the United States was “asserting our own position as a Pacific power.” But need this lead to nuclear war? Not necessarily. And yet, there are signs that it could. After all, both the United States and China possess large numbers of nuclear weapons. The U.S. government threatened to attack China with nuclear weapons during the Korean War and, later, during the conflict over the future of China’s offshore islands, Quemoy and Matsu. In the midst of the latter confrontation, President Dwight Eisenhower declared publicly, and chillingly, that U.S. nuclear weapons would “be used just exactly as you would use a bullet or anything else.” Of course, China didn’t have nuclear weapons then. Now that it does, perhaps the behavior of national leaders will be more temperate. But the loose nuclear threats of U.S. and Soviet government officials during the Cold War, when both nations had vast nuclear arsenals, should convince us that, even as the military ante is raised, nuclear saber-rattling persists. Some pundits argue that nuclear weapons prevent wars between nuclear-armed nations; and, admittedly, there haven’t been very many—at least not yet. But the Kargil War of 1999, between nuclear-armed India and nuclear-armed Pakistan, should convince us that such wars can occur. Indeed, in that case, the conflict almost slipped into a nuclear war. Pakistan’s foreign secretary threatened that, if the war escalated, his country felt free to use “any weapon” in its arsenal. During the conflict, Pakistan did move nuclear weapons toward its border, while India, it is claimed, readied its own nuclear missiles for an attack on Pakistan. At the least, though, don’t nuclear weapons deter a nuclear attack? Do they? Obviously, NATO leaders didn’t feel deterred, for, throughout the Cold War, NATO’s strategy was to respond to a Soviet conventional military attack on Western Europe by launching a Western nuclear attack on the nuclear-armed Soviet Union. Furthermore, if U.S. government officials really believed that nuclear deterrence worked, they would not have resorted to championing “Star Wars” and its modern variant, national missile defense. Why are these vastly expensive—and probably unworkable—military defense systems needed if other nuclear powers are deterred from attacking by U.S. nuclear might? Of course, the bottom line for those Americans convinced that nuclear weapons safeguard them from a Chinese nuclear attack might be that the U.S. nuclear arsenal is far greater than its Chinese counterpart. Today, it is estimated that the U.S. government possesses over five thousand nuclear warheads, while the Chinese government has a total inventory of roughly three hundred. Moreover, only about forty of these Chinese nuclear weapons can reach the United States. Surely the United States would “win” any nuclear war with China. But what would that “victory” entail? A nuclear attack by China would immediately slaughter at least 10 million Americans in a great storm of blast and fire, while leaving many more dying horribly of sickness and radiation poisoning. The Chinese death toll in a nuclear war would be far higher. Both nations would be reduced to smoldering, radioactive wastelands. Also, radioactive debris sent aloft by the nuclear explosions would blot out the sun and bring on a “nuclear winter” around the globe—destroying agriculture, creating worldwide famine, and generating chaos and destruction.

#### Prefer specific scenarios - even if things make war more difficult it doesn’t make it unthinkable

James Wood Forsyth, Professor, National Security Studies and Thomas E. Griffith Jr., Dean of Faculty and Academic Programs, National War College, "Through the Glass Darkly: The Unlikely Demise of Great-Power War," STRATEGIC STUDIES QUARTERLY, Fall 2007, http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA509123

The United States cannot prepare to put down any and all potential rivals. The costs of such an undertaking would quickly prove to be enormous, especially when domestic spending on programs like social security and Medicare are factored into the security equation. Over the long haul rivals will emerge, and there is little the United States can do except balance against them, as they will prepare to balance against us. In such a world, where states compete for power, one must be concerned with survival. That being the case, it is worth remembering that the most serious threats to the great powers have historically stemmed from other great powers. In the years ahead, as strong challengers emerge, conflicts will arise, making war among the great powers more, not less, likely. 49 Contrary to popular belief, we are not living in a whole new world. The events of September 11 and the wars that have followed have had a pronounced effect on US foreign and defense policy, but they have not done away with the state system. The world is still made up of states that must look out for themselves. To pretend otherwise is to neglect history or to fall prey to presentism—something common among pundits but dangerous for statesmen and men and women of the armed forces. Historically, the most efficient and effective way to ensure state security is through military means. Thus, the importance of the balance of power, which exists to prevent one great power from dominating the rest, has not diminished. Instead, it has been reinvigorated as states are reminded of the need to defend themselves. The implications of acknowledging the possibility of a great-power war are easier to grasp than to implement. Despite the urgency of the war in Iraq, we need to think seriously about what a great-power war would look like, how it could occur and be prevented, and how it would be fought so that we can gain some understanding about the equipment and forces needed to fight and win. The groundwork for the technologies needed for such a contest needs to be laid today. The difficulties in putting armor on vehicles for Iraq pale in comparison to creating the lead time and resources needed to fight a great-power war. Failing to do so risks lives and jeopardizes US security goals. This does not mean that we should ignore current threats or overlook the need to relieve misery and suffering around the world, what one strategist terms “minding the gap.” 50 As citizens, we should be concerned with the political and human consequences of poverty, ecological degradation, and population growth. We must also fully address the problem of terrorism. But as real as the consequences of poverty, ecological degradation, population growth, and terrorism might be, it is hard to come up with a realistic scenario involving these tragedies that would alter the balance of power. 51 Put simply, in an age of transformation, we cannot neglect the basics. Should the United States find itself in another great-power war, things that are taken for granted today, like air superiority or control of sea lanes, might come up short tomorrow. That technology, economics, democracy, and norms play a role in preventing great-power war is not the issue. The issue is whether they make it unthinkable. Regrettably, they do not, and because they do not, great-power war has a bright future, however tragic that might seem.

### Yes War – Multiwarrant

#### War is likely

Miller 2011

[Paul, assistant professor of international security studies – National Defense University, <http://shadow.foreignpolicy.com/posts/2011/12/16/how_dangerous_is_the_world_part_ii>]

Some scholars are unimpressed with the supposed threats from Russia and China. The end of the Cold War led to a plethora of theories that conventional war was dead, great power conflict was over, competition would take place through trade instead of war, the "end of history" had come, the face of war would be "new" war or a "war amongst the people," while the state was dead and non-state actors would define world politics. These fads have led most commentators to vastly under-appreciate the persistence of the old fashioned, conventional, state-centric threat that has defined world politics for centuries: great power rivalry. Even if the world is changing in the ways the new-fangled theories claim (and I think those changes are overstated), it is changing much more slowly than critics appreciate. Russia and China remain massive, powerful, and hostile to U.S. interests-like they were during the Cold War. The "Cold War," after all, was just a name given to typical great power relations in an atypically bipolar environment. What was unique was not the global-chessboard contest, the mutual suspicion and hostility, and the division of the world into spheres of influence. Those features tend to characterize great power relations in any era of history. What made the Cold War distinct was the presence of only two major powers and the ideological dimension to the contest. In the post-Cold War world, the sharp ideological divide has been dampened, but suspicion and competition among big states remains a permanent and dangerous feature of world politics.

#### Self-interest proves

Coker 2011

[Christopher Coker is Professor of International Relations at the London School of Economics and Political Science, “Review: Why Nations Fight, Richard Ned Lebow”, Ethics & International Affairs, 25, no. 3 (2011), pp. 385–391,] Why Nations Fight has Richard Ned Lebow’s familiar stamp: it is meticulously researched, trenchantly argued, grounded in extraordinarily wide reading, and informed by a healthy dose of common sense. He has no truck with authors, such as John Mueller, who argue that war is now in terminal decline, especially among the great powers. According to Lebow, **four** generic **motives have** historically **led to war: fear, interest, status, and revenge**—**and all of them are still likely to lead to future conﬂict**. None of these motives can be effectively addressed by war, but what we perceive to be objectively true does not always accord with objective reality. As for Mueller’s claim that war will go the way of dueling and slavery in the nineteenth century, I would go as far as to say that neither slavery nor dueling has disappeared. According to the United Nations there are 29 million slaves in the world today (in absolute terms, the highest number in history). Nor have we given up dueling: we simply have moved the practice to the courts, where we sue our enemies for defamation. As for war, it is positively protean in its ability to be re-branded. **Yesterday’s foot soldiers have been joined by “cyber-warriors”** and “cubicle warriors” (the drone pilots who remotely deal in death and destruction over the skies of Pakistan and now Yemen). Precisely because we have removed much of the risk to our own personnel, **we have given war a renewed lease on life**, even if at the same time we have rendered it post-heroic. “I hope that many more computer chips will lay down their lives for their country,” remarked an American colonel after the downing of a drone in Bosnia in the 1900s. Lebow is famous for challenging the inherent philistinism of neopositivism in American social science. He has read the Greeks and knows his Thucydides, the very ﬁrst military historian (the man who invented the genre) and who called war “the human thing.” It is humanity that the neopositivists largely ignore. As in Lebow’s last book, A Cultural Theory of International Relations, he challenges the realist emphasis on material factors, stressing instead **motives deriving from the need of states for reputation, status, and standing. States, like people, need to be esteemed: they need to be accorded a ranking among other states, and they need to be honored. And they are willing to avenge themselves for any slight they feel has been inﬂicted upon them**

### A2 Deterrence

#### Deterrence fails – imperfect information

Krieger 8 – Dr. Dave, Founder of the Nuclear Age Peace Foundation

At the Nuclear Precipice, p.5

During the Cold War the possession and development of nuclear weapons were justified in public by their official and nonofficial advocates primarily as instruments of deterrence to be used in restraining others from nuclear use and thus "necessary" for keeping the peace. Deterrence was never more than a label for a policy, actually a very unstable and misrepresented one, logically analyzed to death, but rarely subjected to experiential tests by reference to changing military balances, real-time accidents and misperceptions, and the recklessness of sociopaths or paranoid leaders. For deterrence to work there must be rational decision makers operating on the basis of near perfect information about the intentions and behavior of an adversary, a fanciful proposition in times of relative stability, and absurdly unrealistic in times of acute crisis. Communications must always be clear and reliable for deterrence to work, and the more countries with nuclear weapons the harder it will be to assure effective communications. The fabric of deterrence has been shredded in the most recent period of world politics where the main potential attacker is projected as, a nonstate terrorist network without a homeland and led by willing martyrs who cannot be deterred.

#### Nuclear taboo is eroding

Potter 10 [Dr. William Potter is Sam Nunn and Richard Lugar Professor of Nonproliferation Studies and Director of the James Martin Center for Nonproliferation Studies at the Monterey Institute of International Studies (MIIS). “In Search of the Nuclear Taboo: Past, Present, and Future” Proliferation Papers, No. 31, Winter 2010, Chetan]

Less positive indicators of the vitality and durability of any non-use norm, however, also are in evidence. A short list of bad news items includes: the rise in the threat of high consequence nuclear terrorism involving both improvised nuclear devices and intact nuclear weapons, the failure of the CTBT to enter into force, the growing reliance on nuclear weapons by some nuclear weapons possessors to compensate for shortcomings in manpower and/or conventional weapons (e.g., the Russian Federation and Pakistan), the disavowal by the United States during the Bush administration and, more recently by the Russian Federation, of a number of the “13 Practical Steps on Disarmament” adopted at the 2000 NPT Review Conference,12 stalled negotiations between the United States and the Russian Federation over the extension of several key nuclear arms control treaties that will soon expire, the barren results of the 2005 NPT Review Conference and less than encouraging indications for the next Review Conference in 2010, and the erosion of the perceived benefits of non-nuclear weapon status accentuated by the U.S.-India deal and the associated exemption granted to India by the Nuclear Suppliers Group in 2008. Perhaps most troubling is the potential for rapid escalation from conventional to nuclear weapons use in several regions, especially in South Asia. Space does not allow a discussion of all of the aforementioned positive and negative indicators, their impact on the probability that past restraint with respect to nuclear weapons use will either persist or lapse, or the likelihood of occurrence of specific breach scenarios. An examination of several trends, however, may provide some clues as to the durability of non-use and the conditions that might trigger at least a departure from the current norm/tradition/taboo.

### A2 Interdependence

#### International institutions don’t solve the impact – major powers will disregard them if they want to.

Krieger 8 – Dr. Dave, Founder of the Nuclear Age Peace Foundation

At the Nuclear Precipice, p.24

10. There have been trends in recent years for international law to be disregarded as and when it suits those who feel they are in a position to disregard it. An instance is the invasion mounted on Iraq by two of the Permanent Members of the Security Council in disregard of the several rules that have grown up in international law forbidding such action. The rule against unilateral action by individual states without Security Council authorization and the principle that architectural and historical objects and sites are to be preserved are just two, which illustrate the wide range of matters covered by these principles. These are all well-established rules of international law and some of them are enshrined in the UN Charter itself. They were built upon the sacrifice of millions of lives and need to be respected. When international law is disregarded, especially by powerful states, it removes restraints that would otherwise operate on others who desire to use force illegally and flout the rules of international law.

#### Economic interdependence doesn’t check

Antov 11 [Michael – Department of Political Science at Duke University, “Economic Interdependence and International Conflict: The Implications of Membership in International Economic, Financial, and Monetary Organizations and Multilateral Preferential Trade Agreements”, December 15th, 2011, <http://dukespace.lib.duke.edu/dspace/bitstream/handle/10161/5095/2011-12-15%20Milen%20Antov%20Senior%20Thesis.pdf?sequence=1>, Chetan]

In contrast to the liberal arguments, realists have argued that in an anarchic world in which states are solely concerned with preserving their existence, the more interactions among states there are, the higher the likelihood of conflict (Mearsheimer, 1995). That is, economic interdependence provides yet another potential interstate asymmetry and is thus a reason for conflict initiation. Most notably in the economic interdependence – conflict debate, Katherine Barbieri’s empirical tests have shown that bilateral trade increases the probability of MIDs (militarized interstate disputes). (1996, 2001, 2002). Her central claim is that, “rather than inhibiting conflict, extensive economic interdependence increases the likelihood that dyads will engage in militarized interstate disputes” (1996: 29). Barbieri recognizes that low to moderate degrees of interdependence may reduce the likelihood of conflict, but she argues that, the more extensive the linkages become, the more likely interdependence will have the opposite effect. As Maoz points out, another powerful realist theory is that states’ strategic interests matter more than economic interdependence does – countries can be economically interdependent and still fight over non-economic interests (2009). Realists have focused on the causes of war and “have emphasized the conflictual aspects of international transactions whereas liberals clearly emphasize the beneficial aspects. From this different starting point, realists come to the conclusion that [economic] interdependence either increases the likelihood of war or is not related to war initiation” (McMillan, 1997: 40). Moreover, it should be noted that realists are above all concerned with war (in terms of armed conflict with at least 25 battle-related deaths or other much higher death thresholds), while liberals have considered a diversity of conflict types, primarily focusing on MIDs.

# Yes Nuclear Extinction

### Frontline

#### Most recent evidence proves nuclear winter causes extinction

Starr 12 [Steven Starr - Director of the Clinical Laboratory Science Program at the University of Missouri-Columbia, Associate member of the Nuclear Age Peace Foundation, has been published by the Bulletin of the Atomic Scientists, his writings appear on the websites of the Nuclear Age Peace Foundation, the Moscow Institute of Physics and Technology Center for Arms Control, Energy and Environmental Studies, Scientists for Global Responsibility, and the International Network of Scientists Against Proliferation, “What is nuclear darkness?,” <http://www.nucleardarkness.org/web/whatisnucleardarkness/>]

In a nuclear war, burning cities would create millions of tons of thick, black smoke. This smoke would rise above cloud level, into the stratosphere, where it would quickly spread around the planet. A large nuclear war would produce enough smoke to block most sunlight from reaching the Earth's surface. Massive absorption of warming sunlight by a global stratospheric smoke layer would rapidly create Ice Age temperatures on Earth . The cold would last a long time; NASA computer models predict 40% of the smoke would still remain in the stratosphere ten years after a nuclear war. Half of 1% of the explosive power of US-Russian nuclear weapons can create enough nuclear darkness to impact global climate. 100 Hiroshima-size weapons exploded in the cities of India and Pakistan would put up to 5 million tons of smoke in the stratosphere . The smoke would destroy much of the Earth's protective ozone layer and drop temperatures in the Northern Hemisphere to levels last seen in the Little Ice Age. Shortened growing seasons could cause up to 1 billion people to starve to death. A large nuclear war could put 150 million tons of smoke in the stratosphere and make global temperatures colder than they were 18,000 years ago during the coldest part of the last Ice Age. Killing frosts would occur every day for 1-3 years in the large agricultural regions of the Northern Hemisphere. Average global precipitation would be reduced by 45%. Earth's ozone layer would be decimated. Growing seasons would be eliminated. A large nuclear war would utterly devastate the environment and cause most people to starve to death . Deadly climate change, radioactive fallout and toxic pollution would cause already stressed ecosystems to collapse. The result would be a mass extinction event that would wipe out many animals living at the top of the food chains - including human beings.

#### Nuclear war will escalate --- restraint would invite aggression

Dennis Ray **Morgan 9**, Hankuk University of Foreign Studies, Yongin Campus - South Korea, Futures, Volume 41, Issue 10, December 2009, Pages 683-693

And what many people fail to realize is what a precarious, hair-trigger basis the nuclear web rests on. Any accident, mistaken communication, false signal or ‘‘lone wolf’ act of sabotage or treason could, in a matter of **a few minutes**, unleash the use of nuclear weapons, and once a weapon is used, then the likelihood of a **rapid escalation** of nuclear attacks is quite high while the likelihood of a limited nuclear war is actually **less probable** since each country would act under the ‘‘use them or lose them’’ strategy and psychology; restraint by one power would be interpreted as a weakness by the other, which could be exploited as a window of opportunity to ‘‘win’’ the war. In otherwords, once Pandora’s Box is opened, it will spread quickly, as it will be **the signal** for permission for anyone to use them. Moore compares swift nuclear escalation to a room full of people embarrassed to cough. Once one does, however, ‘‘everyone else feels free to do so. The bottom line is that as long as large nation states use internal and external war to keep their disparate factions glued together and to satisfy elites’ needs for power and plunder, these nations will attempt to obtain, keep, and inevitably use nuclear weapons. And as long as large nations oppress groups who seek selfdetermination, some of those groups will look for any means to fight their oppressors’’ [10]. In other words, as long as war and aggression are backed up by the implicit threat of nuclear arms, it is only a matter of time before the escalation of violent conflict leads to the actual use of nuclear weapons, and once even just one is used, it is very likely thatmany, if not all, will be used, leading to horrific scenarios of global death and the destruction of much of human civilization while condemning a mutant human remnant, if there is such a remnant, to a life of unimaginable misery and suffering in a nuclear winter.

### Yes Escalation

#### Multiple factors ensure escalation

**Cirincione, foreign services prof, 6** (Joseph, Prof of Foreign Service at Georgetown University Senior Associate and Director for Non-Proliferation, Carnegie Endowment for International Peace (Joseph, July, Nuclear Proliferation Status, http://units.aps.org/units/fps/newsletters/2006/july/article4.cfm, AG)

Existing regional nuclear tensions already pose **serious risks**. The decades-long conflict between India and Pakistan has made South Asia for many years the region most likely to witness the first use of nuclear weapons since World War II. There is an active missile race underway between the two nations, even as India and China continue their rivalry. In Northeast Asia, North Korea's nuclear capabilities remain shrouded in uncertainty but presumably continue to advance. **Miscalc**ulation or misunderstanding could bring nuclear war to the Korean peninsula. In the Middle East, Iran's quest for nuclear weapons, together with Israel's nuclear arsenal and the chemical weapons of other Middle Eastern states, adds grave **volatility** to an already conflict-prone region. If Iran were to acquire nuclear weapons, Egypt, Saudi Arabia, or others might initiate or revive nuclear weapon programs. It is possible that the Middle East could go from a region with one nuclear weapon state, to one with two, three, or five such states within a decade—with existing political and territorial disputes still unresolved.[2] This is **a recipe for nuclear war**. The Risk from Existing Arsenals There are grave dangers inherent in the maintenance of thousands of nuclear weapons by the United States and Russia and the hundreds of weapons held by China, France, the United Kingdom, Israel, India, and Pakistan. While each state regards its nuclear weapons as safe, secure, and essential to its security, each views others' arsenals with suspicion. Though the Cold War has been over for more than a dozen years, Washington and Moscow maintain thousands of warheads on hair-trigger alert, ready to launch within fifteen minutes. This greatly increases the risk of an unauthorized launch. Because there is no time buffer built into each state’s decision-making process, this extreme level of readiness also enhances the possibility that either side’s president could prematurely order a nuclear strike based on flawed intelligence.[3]

### Yes Extinction

#### Nuclear war causes extinction—most qualified evidence

**Robock ’11** (Alan, Department of Environmental Sciences, Rutgers University, “Nuclear winter is a real and present danger”, May 18, <http://www.nature.com/nature/journal/v473/n7347/full/473275a.html>, CMR)

In the 1980s, discussion and debate about the possibility of a 'nuclear winter' helped to end the arms race between the United States and the Soviet Union. As former Soviet president Mikhail Gorbachev said in an interview in 2000: “Models made by Russian and American scientists showed that a nuclear war would result in a nuclear winter that would be **extremely destructive to all life on Earth**; the knowledge of that was a great stimulus to us, to people of honour and morality, to act.” As a result, the number of nuclear weapons in the world started to fall, from a peak of about 70,000 in the 1980s to a total of about 22,000 today. In another five years that number could go as low as 5,000, thanks to the New Strategic Arms Reduction Treaty (New START) between the United States and Russia, signed on 8 April 2010. Yet the environmental threat of nuclear war **has not gone away**. The world faces the prospect of a smaller, **but still catastrophic**, nuclear conflict. There are now nine nuclear-weapons states. Use of **a fraction** of the global nuclear arsenal by anyone, from the superpowers to India versus Pakistan, still presents the largest potential environmental danger to the planet by humans. That threat is being ignored. One reason for this denial is that the prospect of a nuclear war is so horrific on so many levels that most people simply look away. Two further reasons are myths that persist among the general public: that the nuclear winter theory has been disproved, and that nuclear winter is no longer a threat. **These myths need to be debunked**. The term 'nuclear winter', coined by Carl Sagan and his colleagues in a 1983 paper1 in Science, describes the dramatic effects on the climate caused by smoke from fires ignited by nuclear attacks on cities and industrial areas. In the 1980s my colleagues and I calculated, using the best climate models available at the time, that if one-third of the existing arsenal was used, there would be so much smoke that surface temperatures would plummet below freezing around the world for months, **killing virtually all plants** and producing **worldwide famine.** More people could die in China from starvation than in the nations actively bombing each other. As many countries around the world realized that a superpower nuclear war would be a disaster for them, they pressured the superpowers to end their arms race. Sagan did a good job of summarizing the policy impacts2 in 1984: although weapons were continuing to be built, it would be suicide to use them. The idea of climatic catastrophe was fought against by those who wanted to keep the nuclear-weapon industry alive, or who supported the growth of nuclear arsenals politically3. Scientifically, there was no real debate about the concept, only about the details. In 1986, atmospheric researchers Starley Thompson and Stephen Schneider wrote a piece in Foreign Affairs appraising the theory4 and highlighting what they saw as the patchiness of the effect. They coined the term 'nuclear autumn', noting that it wouldn't be 'winter' everywhere in the aftermath of a nuclear attack. They didn't mean for people to think that it would be all raking leaves and football games, but many members of the public, and some pro-nuclear advocates, preferred to take it that way. The fight over the details of the modelling caused a rift between Sagan and Schneider that never healed. When I bring up the topic of nuclear winter, people invariably tell me that they think the theory has been disproved. But **research continues to support the original concept**. By 2007, models had began to approximate a realistic atmosphere up to 80 kilometres above Earth's surface, including the stratosphere and mesosphere. This enabled me, and my coauthors, to calculate for the first time that smoke particles would be heated by the Sun and lifted into the upper stratosphere, where they would stay for many years5, 6. So the cooling would last for much longer than we originally thought. Dark days Many of those who do accept the nuclear-winter concept think that the scenario applies only to a mass conflict, on a scale no longer conceivable in the modern world. This is also false. A 'small' nuclear war between India and Pakistan, with each using 50 Hiroshima-size bombs (far less than 1% of the current arsenal), if dropped on megacity targets in each country would produce climate change unprecedented in recorded human history5. Five million tonnes of black carbon smoke would be emitted into the upper troposphere from the burning cities, and then be lofted into the stratosphere by the heat of the Sun. Temperatures would be lower than during the 'Little Ice Age' (1400–1850), during which famine killed millions. For several years, growing seasons would be shortened by weeks in the mid-latitudes (see 'A decade of cooling). Brian Toon at the University of Colorado in Boulder, Richard Turco at the University of California, Los Angeles, Georgiy Stenchikov at Rutgers University in New Brunswick, New Jersey, and I, all of whom were **pioneers in nuclear-winter research** in the 1980s, have tried, along with our students, to publicize our results. We have published refereed journal articles, popular pieces in Physics Today and Scientific American, a policy forum in Science, and now this article. But Foreign Affairs and Foreign Policy, perhaps the two most prominent foreign-policy magazines in English, **would not even review articles we submitted**. We have had no luck getting attention from the US government. Toon and I visited the US Congress and gave briefings to congressional staff on the subject two years ago, but nothing happened as a result. The US President's science adviser John Holdren has not responded to our requests — in 2009 and more recently — for consideration of new scientific results in US nuclear policy.

#### Researchers confirm this conclusion

Wickersham 10 (University of Missouri adjunct professor of Peace Studies and a member of The Missouri University Nuclear Disarmament Education Team, author book about nuclear disarmament education (Bill, 4/11/10, “Threat of ‘nuclear winter’ remains New START treaty is step in right direction.” <http://www.columbiatribune.com/news/2010/apr/11/threat-of-nuclear-winter-remains/>)

In addressing the environmental consequences of nuclear war, Columbian Steve Starr has written a summary of studies published by the Bulletin of the International Network of Engineers and Scientists Against Proliferation, which concludes: “U.S. researchers have confirmed the scientific validity of the concept of ‘nuclear winter’and have demonstrated that any conflict which targets even a tiny fraction of the global arsenal will cause catastrophic disruptions of the global climate.” In another statement on his Web site, Starr says: “If 1% of the nuclear weapons now ready for war were detonated in large cities, they would utterly devastate the environment, climate, ecosystems and inhabitants of Earth. A war fought with thousands of strategic nuclear weapons would leave the Earth uninhabitable.”

### A2 Counterforce

#### De-escalation is impossible—causes counter value targeting and global devastation

Friedman 2011

(Jonah, Research Intern for the Project on Nuclear Issues, “Countervalue vs. Counterforce”, June 2, <http://csis.org/blog/countervalue-vs-counterforce>)

The argument by GOP House members that countervalue targeting is immoral may be true, but it is also **irrelevant**. There are **few plausible scenarios** in which a nuclear exchange could remain limited, despite discussions about nuclear warfighting strategies during the Cold War. As Robert McNamara wrote in a fall 1983 Foreign Affairs article: “Is it realistic to expect that a nuclear war could be limited to the detonation of tens or even hundreds of nuclear weapons, even though each side would have tens of thousands of weapons remaining available for use? The answer is **clearly no**. Such an expectation requires the assumption that even though the initial strikes would have inflicted large-scale casualties and damage to both sides, one or the other—feeling disadvantaged—**would give in**. But under such circumstances, leaders on both sides would be under **unimaginable pressure** to avenge their losses and secure the interests being challenged. And each would fear that the opponent might launch a larger attack at any moment…Under such conditions, it is **highly likely** that rather than surrender, each side would **launch a larger attack**, hoping that this step would bring the action to a halt by causing the opponent to capitulate.” Thus, a nuclear exchange would almost **certainly** entail a massive attack, and the deaths of perhaps tens of millions of people. Seeking to mitigate this scenario by killing “only” several million people is to miss the point entirely. **Any nuclear war would be devastating, regardless of any attempt to avoid directly targeting cities,** and by declaring cities as targets the stability induced by MAD is increased. However, U.S. nuclear strategy employs a mix of counterforce and countervalue targeting, and some would argue that the inclusion of enemy military targets is useful. They might point to the ability of nuclear weapons to destroy deeply buried targets, for instance. The counterargument was made by Glaser and Steve Fetter in a 2005 International Security article, “Counterforce Revisited.” They point out that nuclear weapons would not be significantly more effective than conventional weapons at hitting such targets. It is difficult to imagine a scenario which would require the use of nuclear weapons to hit military targets, since to do so is to suppose one of two things: either that one plans to attack these targets in a pre-emptive strike, or that they would be useful to the enemy even after a nuclear exchange. The development of plans and capabilities for a first strike would serve to undermine stability. Concern for an enemy’s military assets would seem to be fruitless except in the case of a nuclear warfighting strategy, since these assets can be hit by conventional weapons. Given that the U.S. is highly unlikely to launch a nuclear first-strike on any nation, and that waging limited nuclear war is **probably impossible**, the **greater emphasis** placed on countervalue targeting (rather than counterforce), the better. In addition, relying solely on a countervalue strategy may become **more attractive** as the United States reduces its nuclear arsenal. Fewer warheads would be available to strike a variety of targets, from enemy weapons and command and control sites to population centers. The imperative to hit military targets would necessarily detract from our ability to threaten the enemy’s cities. Likewise, a commitment to a countervalue-only strategy would have the added benefit of allowing for substantial reductions in our nuclear arsenal, since the need to hit additional targets is eliminated.

# Negative

## AT: Warming

### It’s Natural

#### Warming is natural

**BELL 11-3-2010** (Larry, Prof at U Houston, http://www.forbes.com/2010/11/02/global-warming-climate-change-al-gore-opinions-columnists-larry-bell.html)

Yes, there is no doubt about it. The planet is experiencing a siege of abnormally high temperatures. This has now been going on for 15,000 to 18,000 years, a life-friendly period known as an interglacial cycle. During glacial ages that exist about 90% of the time, our Northern Hemisphere is mostly covered with ice up to several miles thick. Records of these alternating glacial and interglacial fluctuations reveal the near regularity of an electrocardiogram over many hundreds of thousands of years … beginning long before the man-made inventions of agriculture, smokestacks, SUVs and carbon offset trading scams. And just how abnormally warm is it now? Let's consider some "recent" comparisons. Temperatures are probably about the same today as during a "Roman Warm Period" slightly more than 2,000 years ago, and much warmer than the "Dark Ages" that followed. They are cooler than the "Medieval Warm Period" about 1,000 years ago when Eric the Red and his Icelandic Viking tribe settled on grasslands of Greenland's southwestern coast, and much warmer than about 400 years ago when the Northern Hemisphere plunged into depths of a "Little Ice Age" (not a true Ice Age). Near the end of that period Washington's army suffered brutal cold at Valley Forge (1777), and Napoleon's, a frigid retreat from Russia (1812).

#### Not anthropogenic—solar variance

**BELL 11-3-2010** (Larry, Prof at U Houston, http://www.forbes.com/2010/11/02/global-warming-climate-change-al-gore-opinions-columnists-larry-bell.html)

Short- and long-term solar fluctuations have important influences too. Decadal and longer changes in sunspot activity impacting warming and cooling cloud cover patterns are now being recognized as an important factor. Other solar changes occurring at approximate 1,500 year intervals also influence climate. Greenland, for example, has experienced an estimated 600 of these cycles over the past million years.

#### Warming is due to solar variations

**WOJICK 2005** (David, President of Climatechange.org, Electricity Daily, January 10)

U.S. climate change research policy is seriously out of whack. There is growing evidence that solar variability is responsible for most of the global warming in the last century ( ED, Dec 15,2004). Coal fired power plants are being blamed for much of this warming, but if it is actually the sun at work then we are wasting time and a lot of money trying to cut carbon dioxide emissions. Clearly the Bush administration should be looking into this solar angle. But it is not, even though its $2 billion a year Climate Change Science Program just underwent a massive review. The CCSP is doing outdated, entrenched science, that assumes humans are to blame for what may well be a natural phenomenon. The problem is that the federal science program was defined 15 years ago. It was assumed then that the climate is naturally unchanging, so humans must be the cause of the observed warming. Since then we have learned that climate, like weather, is never constant, but the research program has not changed accordingly. In the last 6-8 years the sun has emerged as a big driver of Earth s climate change. For example, consider the findings of the United Nations Intergovernmental Panel on Climate Change, which conducts massive periodic reviews of climate science. In 1995 the IPCC said that the sun was not a factor in the warming over the last century. In 2001 it concluded that more than half of that warming was solar induced, not human induced. Given that the IPCC tends to be biased toward the theory of human induced warming, this was a huge admission. The scientific trend marked by the IPCC s flip flop has continued. The research problem is that the known variations in solar energy are not strong enough to account for all of the observed global warming. But in the last five years a number of indirect, amplifying mechanisms have been identified. The result is that we now know how the sun might account for all of the warming, and there is growing evidence that it does. Research problems do not get any better, or more important, than this. The policy problem is that the CCSP has no plans to do solar-climate research. Because carbon dioxide was assumed to be the culprit, the annual CCSP budget has a $110 million carbon cycle component. But CO2 is a trace gas and the CO2 increase to date cannot explain the observed warming, without assuming a water vapor feedback, so the CCSP also includes a $150 million water-cycle component. There is no corresponding solar-cycle research, what little is done on solar is round-off error. The word solar barely occurs in the new CCSP Strategic Plan, and occurs not at all in the plan s milestones. In short, the climate research program has assumed an old, speculative answer to the warming question (humans are doing it) and is throwing vast quantities of money at that answer. Billions of dollars over the last 15 years. Now that a new answer is emerging (it s the Sun, after all) the CCSP has failed to notice. Clearly its time to put some of these big science bucks into solar climate research. U.S. energy policy hangs in the balance.

### Warming Inevitable—Too late

#### Too late to stop warming

**CLICK GREEN 1-7-2011** (““Unstoppable effects” of climate change will last for 1,000 years,” http://www.clickgreen.org.uk/opinion/opinion/121749-%E2%80%9Cunstoppable-effects%E2%80%9D-of-climate-change-will-last-for-1,000-years.html)

New research indicates the impact of rising CO2 levels in the Earth's atmosphere will cause unstoppable effects to the climate for at least the next 1000 years, causing researchers to estimate a collapse of the West Antarctic ice sheet by the year 3000, and an eventual rise in the global sea level of at least four metres. The study, to be published next week, is the first full climate model simulation to make predictions out to 1000 years from now. It is based on best-case, 'zero-emissions' scenarios constructed by a team of researchers from the Canadian Centre for Climate Modelling and Analysis (an Environment Canada research lab at the University of Victoria) and the University of Calgary. "We created 'what if' scenarios," says Dr. Shawn Marshall, Canada Research Chair in Climate Change and University of Calgary geography professor. "What if we completely stopped using fossil fuels and put no more CO2 in the atmosphere? How long would it then take to reverse current climate change trends and will things first become worse?" The research team explored zero-emissions scenarios beginning in 2010 and in 2100.

### Warming Inevitable—Population Rates

#### Warming inevitable—even at lesser population growth rates, we’re still producing too much carbon dioxide to overcome

**Husler and Sornette ’11** (A.D., and D. Department of Management, Technology and Economics, ETH Zurich, “Evidence for super-exponentially accelerating atmospheric carbon dioxide growth,” 3/17/11, AM)

We have analyzed the growth of atmospheric carbon dioxide and of what constitutes arguably its most important underlying driving variable, namely human population. Our empirical calibrations suggest that human population has decelerated from its previous super-exponential growth until 1960 to \just" an exponential growth. **As for atmospheric CO2 content, we find that it is at least exponentially increasing and more probably exhibiting an accelerating growth rate**, consistent with a FTS (\_nite-time singular) power law regime. We have proposed a simple framework to think about these dynamics, based on endogenous economic growth theory. We showed that the positive feedback loops between several variables, such as population, technology and capital can give rise to the observed FTS behavior, notwithstanding the fact that the dynamics of each variable would be stable or at most exponential, conditional on the stationarity of the other variables. It is the joint growth of the coupled variables that may give rise to the enormous acceleration characterized by the FTS behavior, both in the equation and, we present suggestive evidence, in the carbon dioxide content in the atmosphere. Overall, the evidence presented here does not augur well for the future. \_ The human population is still growing at a non-sustainable rate and there is no sign the population will stabilize anytime soon. **Many argue that economic developments and education of women will lead to a decrease growth rate and an eventual stabilization of human population. This is not yet observed in the population dynamics**, when integrated worldwide. Let us hope that the stabilization of the human population will occur endogenously by self-regulation, rather than by more stringent finite carrying capacity constraints that can be expected to lead to severe strains on a significant fraction of the population.

### Warming—CO2 Not Key

#### Carbon dioxide does not lead to global warming—Provides cooling through photosynthesis

Philip **Haddad** June 22, **2011** PhD Chem. E. retd. Carbon Dioxide does not Cause Global Warming! http://www.alvinsun.net/articles/2011/06/22/opinion/editorials/doc4e0228a53ed3d528547342.txt

There is a mistaken notion that carbon dioxide is the cause of global warming. Although there is a clear correlation between the rate of rise of temperature and the rate of rise of carbon dioxide concentration in the atmosphere, this is because 80 percent of our energy comes from fossil fuels. The carbon dioxide is just an indicator of all the energy consumed. Where does all this energy go? It goes into the atmosphere. The real damage caused by the “carbon dioxide greenhouse” myth it now is assumed that any energy source that does not produce carbon dioxide is acceptable. Hogwash! Energy is heat. As a “greenhouse” gas, carbon dioxide is insignificant compared to water vapor. For example, in arid regions the temperature swings from very hot in the day to frigid at night due to loss of heat through radiation. Yet the atmosphere there has the same carbon dioxide concentration as the more humid areas. Furthermore, carbon dioxide provides cooling through photosynthesis.

#### CO2 isn’t key to warming

**BELL 11-3-2010** (Larry, Prof at U Houston, http://www.forbes.com/2010/11/02/global-warming-climate-change-al-gore-opinions-columnists-larry-bell.html)

More recent temperature variations have been relatively much more stable and moderate. The past century witnessed two distinct warming periods, one occurred from 1900-1945, and another from 1975-1998. About half of that total warming occurred before the mid-1940s. And while CO2 levels have continued to rise, there hasn't been statistically significant warming since 1998 (the end of a strong El Nino season). Those who pay honest attention to long-term climate patterns will note that atmospheric CO2 concentration fluctuations do not lead, but typically follow, temperature changes. That's because oceans are huge CO2 sinks, absorbing CO2 as they cool, and releasing CO2 as they warm up. (When you open a carbonated beverage you experience the same phenomenon. If the beverage is cold, it retains CO2. If it is warm, it releases CO2 and sprays all over.) These temperature shifts are heavily influenced by entirely natural ocean cycle fluctuations that affect heat transfer patterns from the tropics. In the Arctic these oscillations occur about every 60 to 70 years.

**CO2 isn’t key—paleoclimatic data**

**NIPCC 2009** (Nongovernmental International Panel on Climate Change, “Climate Change Reconsidered,” June, http://www.nipccreport.org/reports/2009/pdf/CCR2009FullReport.pdf)

Rothman (2002) derived a 500-million-year history of the air’s CO2 content based on considerations related to the chemical weathering of rocks, volcanic and metamorphic degassing, and the burial of organic carbon, along with considerations related to the isotopic content of organic carbon and strontium in marine sedimentary rocks. The results of this analysis suggest that over the majority of the half-billion-year record, earth’s atmospheric CO2 concentration fluctuated between values that were two to four times greater than those of today at a dominant period on the order of 100 million years. Over the last 175 million years, however, the data depict a long-term decline in the air’s CO2 content. Rothman reports that the CO2 history “exhibits no systematic correspondence with the geologic record of climatic variations at tectonic time scales.” A visual examination of Rothman’s plot of CO2 and concomitant major cold and warm periods indicates the three most striking peaks in the air’s CO2 concentration occur either totally or partially within periods of time when earth’s climate was relatively cool.

### Negative Feedbacks—Solve Warming

#### Negative feedbacks check warming

**DE FREITAS 1-5-2011** (Chris de Freitas is an associate professor in the school of environment at the University of Auckland, NZ Herald, http://www.nzherald.co.nz/nz/news/article.cfm?c\_id=1&objectid=10697845)

The degree of warming directly caused by the extra carbon dioxide is, by itself, relatively small. This is not controversial. What is controversial is whether this initial change will trigger further climate changes that would be large or damaging. Debate focuses on climate feedbacks that may or may not suppress, perpetuate or amplify an initial change caused by increasing concentrations of greenhouse gases. A doubling of carbon dioxide, by itself, adds only about one degree Celsius to greenhouse warming. Computer climate models project more warming because the modellers build in feedbacks from water vapour and clouds that amplify the initial change. These are the so called positive feedbacks. For example, higher temperature would mean more evaporation globally, which in turn means more heat-trapping water vapour is put into the atmosphere leading to even higher temperatures. On the other hand, negative feedbacks might prevail. For example, more water vapour in the atmosphere could lead to greater cloud cover. Clouds reflect the heat from the Sun and cool the Earth, offsetting the initial rise in global temperature. The role of negative feedback processes are played down by global warming alarmists, whereas sceptics point to the four-billion-year-old global climate record that shows runaway global cooling or warming has never occurred because negative feedbacks regulate the global climate system. It is important to consider the above in the proper context. Change is a constant feature of climate, even through recent human history. During the Medieval Warm Period, from 900 to 1200AD, the Vikings sailed in Arctic waters that by 1700 had turned to permanent sea ice, and farmed in Greenland soil in a climate that soon became too cold for agriculture. The Medieval Warm Period was followed by the Little Ice Age which ended around 1850. It in turn was followed by another warm period. The hottest year since 1850 was 1998. In the nine years since 2002 average annual global temperature has not risen. Most people are surprised to hear that no one has uncovered any empirical real-world evidence that humans are causing dangerous global warming. Finding this evidence is crucial, since scientific issues are resolved by observations that support a theory or hypothesis. They are not resolved by ballot.

### Warming Good—AT Extinction

#### No extinction

**INPCC 11**. Nongovernmental International Panel on Climate Change. Surviving the unprecedented climate change of the IPCC. 8 March 2011. http://www.nipccreport.org/articles/2011/mar/8mar2011a5.html

In a paper published in *Systematics and Biodiversity*, Willis *et al*. (2010) consider the IPCC (2007) "predicted climatic changes for the next century" -- i.e., their contentions that "global temperatures will increase by 2-4°C and possibly beyond, sea levels will rise (~1 m ± 0.5 m), and atmospheric CO2will increase by up to 1000 ppm" -- noting that it is "widely suggested that the magnitude and rate of these changes will result in many plants and animals going extinct," citing studies that suggest that "within the next century, over 35% of some biota will have gone extinct (Thomas *et al*., 2004; Solomon *et al*., 2007) and there will be extensive die-back of the tropical rainforest due to climate change (e.g. Huntingford *et al*., 2008)." On the other hand, they indicate that some biologists and climatologists have pointed out that "many of the predicted increases in climate have happened before, in terms of both magnitude and rate of change (e.g. Royer, 2008; Zachos *et al*., 2008), and yet biotic communities have remained remarkably resilient (Mayle and Power, 2008) and in some cases thrived (Svenning and Condit, 2008)." But they report that those who mention these things are often "placed in the 'climate-change denier' category," although the purpose for pointing out these facts is simply to present "a sound scientific basis for understanding biotic responses to the magnitudes and rates of climate change predicted for the future through using the vast data resource that we can exploit in fossil records." Going on to do just that, Willis *et al*. focus on "intervals in time in the fossil record when atmospheric CO2 concentrations increased up to 1200 ppm, temperatures in mid- to high-latitudes increased by greater than 4°C within 60 years, and sea levels rose by up to 3 m higher than present," describing studies of past biotic responses that indicate "the scale and impact of the magnitude and rate of such climate changes on biodiversity." And what emerges from those studies, as they describe it, "is evidence for rapid community turnover, migrations, development of novel ecosystems and thresholds from one stable ecosystem state to another." And, most importantly in this regard, they report "there is very little evidence for broad-scale extinctions due to a warming world." In concluding, the Norwegian, Swedish and UK researchers say that "based on such evidence we urge some caution in assuming broad-scale extinctions of species will occur due solely to climate changes of the magnitude and rate predicted for the next century," reiterating that "the fossil record indicates remarkable biotic resilience to wide amplitude fluctuations in climate."

#### No extinction—empirics

**INPCC 10**. Nongovernmental International Panel on Climate Change. Past Warm Episodes did not Cause Extinction. 15 July 2010. http://www.nipccreport.org/articles/2010/jul/15jul2010a7.html

Many claims have been made about catastrophic negative effects of increasing air temperature on biodiversity; but nearly all of these claims are based on either speculation or simple correlative models. In the study of Willis *et al*. (2010), on the other hand, past historical periods were identified in which climate was either similar to that projected by global climate models for the next century or so, or in which the rate of temperature change was unusually rapid; and these *real*-world periods were examined to see if any *real*-world climate-related extinctions had occurred. The first period they examined was the Eocene Climatic Optimum (53-51 million years ago), during which time the atmosphere's CO2 concentration exceeded 1200 ppm and tropical temperatures were 5-10°C warmer than modern values. Yet far from causing extinctions of the tropical flora (where the data are best), the four researchers report that "all the evidence from low-latitude records indicates that, at least in the plant fossil record, this was one of the most biodiverse intervals of time in the Neotropics." They also note that "ancestors of many of our modern tropical and temperate plants evolved ...when global temperatures and CO2 were much higher than present...indicating that they have much wider ecological tolerances than are predicted based on present-day climates alone." The second period they examined consisted of two rapid-change climatic events in the Holocene -- one at 14,700 years ago and one at 11,600 years ago -- during which times temperatures increased in the mid- to high-latitudes of the Northern Hemisphere by up to 10°C over periods of less than 60 years. During these events, there is evidence from many sites for rapid plant responses to rapid warming. And the authors note that "at no site yet studied, anywhere in the world, is there evidence in the fossil record for large-scale climate-driven extinction during these intervals of rapid warming." On the other hand, they report that extinctions *did* occur due to the *cold* temperatures of the *glacial* epoch, when subtropical species in southern Europe were driven out of their comfort zone. The study of Willis *et al*. also makes use of recent historical data, as in the case of the 3°C rise in temperature at Yosemite Park over the past 100 years. In comparing surveys of mammal fauna conducted near the beginning and end of this period, they detected some changes, but no local extinctions. Thus, they determined that for all of the periods they studied, with either very warm temperatures or very rapid warming, there were no detectable extinctions.

### 1NC SO2 Good Shell

#### They cause faster warming – because large emission reductions remove sulfate aerosols which cool the Earth

**Lovelock ‘9**, Consultant of NASA, former president of the Marine Biological Association, and Honorary Visiting Fellow of Green Templeton College, Oxford (James, The Vanishing Face of Gaia: A Final Warning: Enjoy it While You Can, 55-56

In 2004, two IPCC contributors, Peter Cox and Meinrat Andreae, raised the question: What happens to global warming if this pollution haze suddenly disappears? Their paper in Nature warned that if the haze disappeared, global heating would intensify, and dangerous change could be the consequence. In 2008, a group led by Peter Scott, from the Hadley Centre (part of the Meterological Office), examined this phenomenon in a careful and wall-drawn paper in the journal Tellus: "global dimming," they revealed, is complex, even as a purely geophysical problem. According to their calculations the sudden removal of haze could lead to either a modest or a severe increase of heating. I know begin to see why my wise friend Robert Charlson is so loath to commit himself on pollution aerosols and climate change. Even so, there was little doubt among any of these distinguished climate scientists that the present pollution haze reduces global heating, or that its sudden removal could have serious consequences. I suspect that we worry less about global heating than about a global economic crash, and forget that we could make both events happen together if we implemented an immediate, global 60 percent reduction of emissions. This would cause a rapid fall in fossil fuel consumption, and most of the particles that make the atmospheric aerosol would within weeks fall from the air. This would greatly simplify prediction and we could at last be fairly sure that global temperature would rise; the removal of the pollution aerosol would leave the gaseous greenhouse unobstructed and free at last to devastate what was left of the comfortable interglacial Earth. Yes, if we implemented in full the recommendations made at Bali within a year, far from stabilizing the climate, it could grow hotter not cooler. This is why I said in The Revenge of Gaia, "We live in a fool's climate and are damned whatever we do."

#### Sulfur offsets carbon dioxide solves warming

Walsh 11

[Bryan-staffwriter, “Has China Sky Helped Slow Global Warming,” July 5, 2011, http://science.time.com/2011/07/05/has-china-sky-helped-slow-global-warming/]

As it turns out, however, China sky may actually have another, surprising impact on global warming. For a while now scientists [have been somewhat perplexed](http://www.washingtonpost.com/politics/sulfur-pollution-cites-as-cause-of-climate-change-pause-warming-now-seems-to-be-resuming/2011/07/04/gHQAFkAWxH_story.html) that the rise in the Earth's temperatures paused for a time during the 2000s. It's not that the Earth cooled—the last decade was [the hottest on record](http://www.nasa.gov/home/hqnews/2010/jan/HQ_10-017_Warmest_temps.html)—but global surface temperatures stopped showing a continuing rising trend even as carbon emissions grew year by year. Something had to be acting to offset the warming that should otherwise have been caused by increasing carbon concentrations in the atmosphere. According to a [study published this week](http://www.pnas.org/content/early/2011/06/27/1102467108) in the *Proceedings of the National Academy of Sciences*, we can blame—or thank—China and its coal industry. The authors of the study—led by Robert Kaufmann of the [Center for Energy and Environmental Studies](http://www.bu.edu/cees/) at Boston University—noted that during the time period there was an 11-year decline in solar input, as well as a cyclical shift from an El Nino to a La Nina climate pattern, which is associated with cooling. But the larger effect might have come from the rapid growth in Chinese coal combustion, which doubled between 2003 and 2007—, leading to an increase in sulfur emissions and that white China sky. Sulfate particles can have a cooling effect on global temperatures because they can reflect sunlight back into space—something seen most recently in 1991, when the volcano Mt. Pinatubo erupted in the Philippines, [spewing up to 30 million tons of sulfur dioxide](http://geography.about.com/od/globalproblemsandissues/a/pinatubo.htm) high into the atmosphere. That led global temperatures to fall about 0.5 C in 1992 and 1993, before the sulfur eventually fell from the atmosphere. The sudden spike in sulfur from Chinese coal combustion over the past decade could have had a similar cooling effect that would have offset at least some of the expected warming from rising greenhouse gas emissions. It wouldn't even be the first time that had happened—there was a similar slowdown in warming during the 30 years following World War II as the global economy boomed on the back of fossil fuels, only to see warming pick up as pollution controls kicked in and companies installed scrubbers in coal-fired power plants.

### SO2 Good—Solves Warming

#### Sulfur emissions slow down global warming

**International Business Times** June 5, **2011** Why Global Warming held steady http://www.ibtimes.com/articles/174415/20110705/global-warming-global-warming-held-steady-sulphur-from-chinese-power-stations-carbon-dioxide.htm

[Global warming](http://www.ibtimes.com/topics/detail/224/global-warming/) temporarily halted over the past decade instead of an apparent increase in greenhouse gas emissions. According to a new study, Scientists claim that sulphur emissions from [China](http://www.ibtimes.com/topics/detail/227/china/)’s coal-fired power stations are blocking sunlight and having a cooling effect on the atmosphere. Burning coal releases carbon dioxide and sulfur particles. Carbon dioxide traps heat from the Sun, raising temperatures. Sulfur particles in the air deflect the sun’s rays and can temporarily cool things down a bit. "During the Chinese economic expansion there was a huge increase in sulphur emissions," Dr Robert Kaufmann, of Boston University, told the journal Proceedings of the National Academy of Sciences, Daily Mail reported. Chinese coal consumption to produce power jumped to double between 2002 and 2007, which is an increase of around 26 percent in global coal consumption.

#### Sulfur emissions decrease warming’s effect

Robert K. **Kaufmann** **2011** Department of Geography and Environment, Center for Energy & Environmental Studies, and Heikki Kauppi Department of Economics, Rehtorinpellonkatu University of Turku, Finland, and Michael L. Mann Department of Economics, Harvard University, Cambridge Reconciling anthropogenic climate change with observed temperature 1998 – 2008 http://www.economics.harvard.edu/faculty/stock/files/PNAS\_Paper\_Final\_with\_figs.pdf

Increasing emissions and concentrations of carbon dioxide receive considerable attention, but our analyses identify an important change in another pathway for anthropogenic climate change—a rapid rise in anthropogenic sulfur emissions driven by large increases in coal consumption in Asia in general, and China in particular. Chinese coal consumption more than doubles in the four years from 2003 to 2007 (the previous doubling takes 22 years, 1980-2002). In this four-year period, Chinese coal consumption accounts for 77 percent of the 26 percent rise in global coal consumption (8). These increases are large relative to previous growth rates. For example, global 4 coal consumption increases only 27 percent in the twenty-two years between 1980 and 2002 (8). Because of the resultant increase in anthropogenic sulfur emissions, there is a 0.06W/m (absolute) increase in their cooling effect since 2002 (Figure 1). This increase partly reverses a period of declining sulfur emissions that had a warming effect of 0.19 W/m between 1990 and 2002. The increase in sulfur emissions slows the increase in radiative forcing due to rising greenhouse gas concentrations (Figure 1). Net anthropogenic forcing rises 0.13 W/m between 2002 and 2007, which is smaller than the 0.24 W/m rise between 1997 and 2002. The smaller net increase in anthropogenic forcing is accompanied by a 0.18 W/m decline in solar insolation caused by the declining phase of the eleven-year solar cycle, such that the sum of modelled forcings increases little after 1998 and declines after 2002 (Figure 1). This cooling effect is amplified by a net increase in the Southern Oscillation Index (SOI) (9).

#### Sulfur emissions cancel with anthropogenic emissions

Robert K. **Kaufmann** **2011** Department of Geography and Environment, Center for Energy & Environmental Studies, and Heikki Kauppi Department of Economics, Rehtorinpellonkatu University of Turku, Finland, and Michael L. Mann Department of Economics, Harvard University, Cambridge Reconciling anthropogenic climate change with observed temperature 1998 – 2008 http://www.economics.harvard.edu/faculty/stock/files/PNAS\_Paper\_Final\_with\_figs.pdf

The finding that the recent hiatus in warming is driven largely by natural factors does not contradict the hypothesis: ―most of the observed increase in global average temperature since the mid 20 th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations (14).‖ As indicated in Figure 1, anthropogenic activities that warm and cool the planet largely cancel after 1998, which allows natural variables to play a more significant role. This is not the first period in the 9 instrumental temperature record when the effects of anthropogenic changes in greenhouse gases and sulfur emissions on radiative forcing largely cancel. In-sample simulations indicate that temperature does not rise between the 1940‘s and 1970‘s because the cooling effects of sulfur emissions rise slightly faster than the warming effect of greenhouse gases. The post 1970 period of warming, which constitutes a significant portion of the increase in global surface temperature since the mid 20 th century, is driven by efforts to reduce air pollution in general and acid deposition in particular, which cause sulfur emissions to decline while the concentration of greenhouse gases continues to rise.

## AT: Species/Biodiversity

### No impact to species loss

#### Even conservation biologists agree that species loss is slow and there's no impact

Julian Simon (world-renowned economist) 1998 The Ultimate Resource II, <http://www.juliansimon.com/writings/Ultimate_Resource/TCHAR31.txt>)

Starting in the early 1980s I published the above critical analysis of the standard extinction estimates. For several years these criticisms produced no response at all. But then in response to questions that I and others raised, the "official" IUCN (the World Conservation Union) commissioned a book edited by Whitmore and Sayer to inquire into the extent of extinctions. The results of that project must be considered amazing. All the authors - the very conservation biologists who have been most alarmed by the threat of species die-offs - continue to be concerned about the rate of extinction. Nevertheless, they confirm the central assertion; all agree that the rate of known extinctions has been and continues to be very low. I will tax your patience with lengthy quotations (with emphasis supplied) documenting the consensus that there is no evidence of massive or increasing rates of species extinction, because this testimony from the conservation biologists themselves is especially convincing; furthermore, if only shorter quotes were presented, the skeptical reader might worry that the quotes were taken out of context. (Even so, the skeptic may want to check the original texts to see that the quotations fairly represent the gist of the authors' arguments.)

#### Species loss doesn’t snowball

Thomas Gale Moore 98 (Senior Fellow at the Hoover Institution at Stanford) 1998 Climate of Fear, 98-99

Nevertheless, the loss of a class of living beings does not typically threaten other species. Most animals and plants can derive their nutrients or receive the other benefits provided by a particular species from more than a single source. If it were true that the extinction of a single species would produce a cascade of losses, then the massive extinctions of the past should have wiped out all life. Evolution forces various life forms to adjust to change. A few may not make the adaptation but others will mutate to meet the new conditions. Although a particular chain of DNA may be eliminated through the loss of a species, other animals or plants adapting to the same environment often produce similar genetic solutions with like proteins. It is almost impossible to imagine a single species that, if eliminated, would threaten us humans. Perhaps if the *E. coli* that are necessary for digestion became extinct, we could no longer exist. But those bacteria live in a symbiotic relationship with man and, as long as humans survive, so will they. Thus any animal that hosts a symbiotic species need not fear the loss of its partner. As long as the host remains, so will parasites and symbiotic species.

### We can recover

#### No impact—mass extinctions will be followed by recovery, not collapse

Michael Ruse (Philosopher and Author) August 24 2002 The Globe and Mail

Let me say straight out that this is the most egregiously mislabelled book I have ever encountered. The author follows in the footsteps of the late Jack Sepkoski, a Chicago paleontologist (and incidentally a sometime student of Gould's), who performed brilliant mega-analyses of the fossil record, gathering together huge amounts of data about past species (and higher taxa) and using computers to extract hitherto-unseen trends and salient features of life's history. Specifically, Sepkoski found that there are times of evolutionary breakthrough, rises in numbers of certain forms of life, followed by cooling-off periods and then rapid decline. Together with his colleague David Raup, Sepkoski also investigated the massive extinction episodes that we find in the fossil record - one of the most recent and famous being the time 65 million years ago, when a comet hit the earth and finished off the dinosaurs. Yet fascinatingly, although Sepkoski argued that extinction is incredibly important in life's history - the mammals would hardly have taken over the world if the dinos were still around - he concluded that in the long run, the overall patterns seem impervious to the extinctions. Life has a tempo of its own, apparently, and can continue despite disruptions..

### Humans can survive

#### We don’t need animals to keep us alive—human evolution guarantees that we will never wipe ourselves out by destroying the environment

Julian Simon (Robert H. Smith School of Business, University of Maryland) 1996 The Ultimate Resource II: People, Materials, and Environment, http://www.rhsmith.umd.edu/faculty/jsimon/Ultimate\_Resource/

Let us begin by going beyond the trends in particular resources. The greatest and most important trend, of which these particular trends are a part, is the trend of this earth becoming ever more livable for human beings. We see the signs of this in our longer life expectancy, improved knowledge of nature, and greater ability to protect ourselves from the elements, living with ever more safety and comfort. But though this larger trend buttresses the particular resource trends, it still provides no causal explanation of the phenomenon we seek to understand. Evolutionary thinking, however, and (more specifically in economics) the sort of analysis suggested by Friedrich Hayek, offers an explanation of the observed long-term trend. Hayek (following upon Hume) urges upon us that humankind has evolved sets of rules and patterns of living which are consistent with survival and growth rather than with decline and extinction, an aspect of the evolutionary selection for survival among past societies. He assumes that the particular rules and living patterns have had something to do with chances for survival--for example, he reasons that patterns leading to higher fertility and more healthful and productive living have led to groups' natural increase and hence survival-- and therefore the patterns we have inherited constitute a machinery for continued survival and growth where conditions are not too different from the past. (This is consistent with a biological view of humankind as having evolved genes that point toward survival. But no such genetic evolution is presupposed by Hayek, in part because its time span is too great for us to understand it as well as we can understand the evolution of cultural rules. It may be illuminating, however, to view mankind's biological nature as part of the long evolutionary chain dating from the simplest plants and animals, a history of increasing complexity of construction and greater capacity to deal actively with the environment.) Let us apply Hayek's general analysis to natural resources. Such resources of all sorts have been a part of human history ever since the beginning. If humankind had not evolved patterns of behavior that increased rather than decreased the amounts of resources available to us, we would not still be here. If, as our numbers increased (or even as our numbers remained nearly stationary), our patterns had led to diminished supplies of plants and animals, less flint for tools, and disappearing wood for fires and construction, I would not be here to be writing these pages, and you would not be here to be reading them.

## AT: Dead Zones

#### Forests check ocean damage

Swanson 9 (Kent, Master’s in Community @ Regional Planning, http://www.practicalenvironmentalist.com/gardening/10-steps-to-a-healthy-ocean-protecting-our-oceans-from-pollution.htm, )

[Biosystems are nature’s utilities](http://www.bagheera.com/inthewild/classroom/class_extinction_why.htm) – they desalinate water, absorb carbon, liberate nutrients from the ground, and provide other services free of charge. The plants and animals that make up these systems are often treated as commodities, but killing the goose that lays golden eggs will only put food on the table for a day. Protecting biosystems can pay dividends for years to come. Forests are an essential buffer for the oceans. Old growth trees neutralize the pH of rain and absorb harmful chemicals before they reach the ocean. Trees that grow in estuaries and along riverways are especially important, but those areas also face increased development pressure and they are easy for loggers to access. Shoreline habitat is being destroyed to build [giant shrimp farms](http://www.gourmet.com/magazine/2000s/2007/03/shrimp) and resort hotels. Luckily, there are now sustainable forestry and aquaculture options available. [Sustainable logging](http://www.spi-ind.com/html/forests_sustainable.cfm) allows limited harvesting of resources without destroying the natural processes that we benefit from. The next time you buy lumber or land, do some research and check for [certifications of sustainability](http://www.enn.com/top_stories/article/9445).

#### Marine life is resilient – rapid reproduction

ITOPF 10 (The International Tanker Owners Federation Limited, February 10, http://www.itopf.com/marine-spills/effects/recovery/,)

Marine organisms have varying degrees of natural resilience to changes in their habitats. The natural adaptations of populations of animals and plants to cope with environmental stress, combined with their breeding strategies, provide important mechanisms for coping with the daily and seasonal fluctuations in their habitats and for recovering from predation and other stochastic events. Some natural phenomena can be highly destructive. The short-term power of hurricanes and tsunamis can easily be appreciated, as can the damage they cause. The cyclical El Niño phenomenon has major long-term consequences for marine organisms, seabirds and marine mammals throughout the entire Pacific Ocean. Organisms suffer under such onslaughts, but after what is often severe disruption and widespread mortality, the marine populations re-establish themselves over a period of time and this process constitutes natural recovery. An important reproductive strategy for many marine organisms is the production of vast numbers of eggs and larvae which are released into the plankton and are widely distributed by currents. This mechanism has evolved to take maximum advantage of available space and resources in marine habitats and to deal with e.g. predation. In some cases, only one or two individuals in a million actually survive through to adulthood. A less common reproductive strategy that is generally restricted to long-lived species that do not reach sexual maturity for many years is to produce relatively few, well-developed, offspring. These species are better adapted to stable habitats and environments and as a result, their populations are likely to take much longer to recover from the pressures of localised mortality e.g. the effects of an oil spill. Whilst there may be considerable debate over what constitutes recovery, there is a widespread acceptance that natural variability in systems makes getting back to the exact pre-spill condition unlikely, and most current definitions of recovery focus on the re-establishment of a community of plants and animals which are characteristic of the habitat and are functioning normally in terms of biodiversity and productivity.

#### The ocean is resilient – absorbs changes

RedOrbit 8 (Staff, November 24, http://www.redorbit.com/news/science/1602528/southern\_ocean\_resilient\_against\_global\_warming/,)

A recent study has found that the Southern Ocean has proved more resilient to global warming than previously thought and remains a major store of mankind's planet-warming carbon dioxide. Oceans act as a brake on climate change by absorbing large portions of the extra CO2 released by mankind through burning fossil fuels or deforestation and experts say the Southern Ocean is the largest of these "carbon sinks." Researchers in the past have suggested the vast ocean between Australia and Antarctica was losing its potency because climate change had affected its currents and increased powerful westerly winds. The analysis between ship-based measurements of the ocean since the 1960s and more recent data from hundreds of robotic floats shows the Southern Ocean has maintained its ability to soak up excess carbon despite changes to currents and wind speeds. "It's a positive thing. It's one thing it looks like we don't have to worry about as much as we thought," said Steve Rintoul of the Center for Australian Weather and Climate Research, part of a team researchers that also included scientists from the Institute for Marine Research at the University of Kiel in Germany. The new data as well as previous studies showed the Southern Ocean was becoming warmer, and also fresher, Rintoul said. The study was published this week in Nature Geoscience. The data on salinity and temperature allowed the team to measure the density of seawater and how that density changed from one place to another in relation to how fast water was moving between two places. "By looking at the density we could say something about the way the major currents were or were not changing. "And this was the surprise. We found that the currents had not changed. They had shifted their position, they'd shifted closer to Antarctica but not become stronger or weaker."

#### Oceans can easily survive acidification

Ridley 10 (Matt, Doctor of Philosophy in Zoology, June 15, http://www.thegwpf.org/the-observatory/1106-matt-ridley-threat-from-ocean-acidification-greatly-exaggerated.html,)

Lest my critics still accuse me of cherry-picking studies, let me refer them also to the results of Hendrikset al. (2010, Estuarine, Coastal and Shelf Science 86:157). Far from being a cherry-picked study, this is a massive meta-analysis. The authors observed that `warnings that ocean acidification is a major threat to marine biodiversity are largely based on the analysis of predicted changes in ocean chemical fields’ rather than empirical data. So they constructed a database of 372 studies in which the responses of 44 different marine species to ocean acidification induced by equilibrating seawater with CO2-enriched air had been actually measured. They found that only a minority of studies demonstrated `significant responses to acidification’ and there was no significant mean effect even in these studies. They concluded that the world's marine biota are `more resistant to ocean acidification than suggested by pessimistic predictions identifying ocean acidification as a major threat to marine biodiversity’ and that ocean acidification `may not be the widespread problem conjured into the 21st century…Biological processes can provide homeostasis against changes in pH in bulk waters of the range predicted during the 21st century.’ This important paper alone contradicts Hoegh-Gudlberg’s assertion that `the vast bulk of scientific evidence shows that calcifiers… are being heavily impacted already’. In conclusion, I rest my case. My five critics have not only failed to contradict, but have explicitly confirmed the truth of every single one of my factual statements. We differ only in how we interpret the facts. It is hardly surprising that my opinion is not shared by five scientists whose research grants depend on funding agencies being persuaded that there will be a severe and rapid impact of carbon dioxide emissions on coral reefs in coming decades. I merely report accurately that the latest empirical and theoretical research suggests that the likely impact has been exaggerated.

## AT: Cuban Economy

#### Can’t solve – structural economic deficiencies

Jorge 2k (Dr. Antonio, Professor of Political Economy at Florida International University, "The U.S. Embargo and the Failure of the Cuban Economy" (2000).Institute for Cuban & Cuban-American Studies Occasional Papers.Paper 28. http://scholarlyrepository.miami.edu/iccaspapers/28)

Under the real world of Castroism, however, the answer must be a terse one: none. The embargo has not harmed the Cuban economy. Cooperation between the United States and Cuba would have been impossible from the very beginning of the Revolution for legal, political, ideological, strategic, and economic reasons, not to mention others of a philosophical or moral character. In other words, it was in the past, and continues to be at present, contrary to the United States’ national interest and to its fundamental foreign policy orientation and objectives to lift the embargo under Castro’s conditions: that is, without a firm commitment to the political democratization and market reforms that his regime has stubbornly opposed for the last 40 years. However, if, purely for the sake of an intellectual exercise, we were to assume that the embargo had never existed, its nonexistence would have had no effect whatsoever on the Cuban economy. Castro simply would have squandered U.S. instead of Soviet resources. Given Castro’s objectives and policies, the ultimate result for the Cuban economy could not have been any different, regardless of who had financed his Revolution.

#### Latin America impacts are empirically denied

**Hartzell 2000** (Caroline A., 4/1/2000, Middle Atlantic Council of Latin American Studies Latin American Essays, “Latin America's civil wars: conflict resolution and institutional change.” http://www.accessmylibrary.com/coms2/summary\_0286-28765765\_ITM)

Latin America has been the site of fourteen civil wars during the post-World War II era, thirteen of which now have ended. Although not as civil war-prone as some other areas of the world, Latin America has endured some extremely violent and destabilizing intrastate conflicts. (2) The region's experiences with civil wars and their resolution thus may prove instructive for other parts of the world in which such conflicts continue to rage. By examining Latin America's civil wars in some depth not only might we better understand the circumstances under which such conflicts are ended but also the institutional outcomes to which they give rise. More specifically, this paper focuses on the following central questions regarding Latin America's civil wars: Has the resolution of these conflicts produced significant institutional change in the countries in which they were fought? What is the nature of the institutional change that has taken place in the wake of these civil wars? What are the factors that are responsible for shaping post-war institutional change?

#### Bioterror risk is low—dispersal problems, tech barriers, risk of back spread—experts agree

John Mueller, Professor, Political Science, Ohio State University, OVERBLOWN: HOW POLITICIANS AND THE TERRORISM INDUSTRY INFLATE NATIONAL SECURITY THREATS, AND WHY WE BELIEVE THEM, 2009, p. 21-22.

For the most destructive results, biological weapons need to be dispersed in very low-altitude aerosol clouds. Because aerosols do not appreciably settle, pathogens like anthrax (which is not easy to spread or catch and is not contagious) would probably have to be sprayed near nose level. Moreover, 90 percent of the microorganisms are likely to die during the process of aerosolization, and their effectiveness could be reduced still further by sunlight, smog, humidity, and temperature changes. Explosive methods of dispersion may destroy the organisms, and, except for anthrax spores, long-term storage of lethal organisms in bombs or warheads is difficult: even if refrigerated, most of the organisms have a limited lifetime. The effects of such weapons can take days or weeks to have full effect, during which time they can be countered with medical and civil defense measures. And their impact is very difficult to predict; in combat situations they may spread back onto the attacker. In the judgment of two careful analysts, delivering microbes and toxins over a wide area in the form most suitable for inflicting mass casualties—as an aerosol that can be inhaled—requires a delivery system whose development "would outstrip the technical capabilities of all but the most sophisticated terrorist" Even then effective dispersal could easily be disrupted by unfavorable environmental and meteorological conditions." After assessing, and stressing, the difficulties a nonstate entity would find in obtaining, handling, growing, storing, processing, and dispersing lethal pathogens effectively, biological weapons expert Milton Leitenberg compares his conclusions with glib pronouncements in the press about how biological attacks can be pulled off by anyone with "a little training and a few glass jars," or how it would be "about as difficult as producing beer." He sardonically concludes, "The less the commentator seems to know about biological warfare the easier he seems to think the task is.""

#### No risk of bioterror and there’s no impact.

Alan Reynolds on March 11, 2010 (Senior Fellow at CATO Institute and former Director of Economic Research at the Hudson Institute, “Anthrax and the WMD Fear Lobby,” http://original.antiwar.com/alan-reynolds/2010/03/10/anthrax-and-the-wmd-fear-lobby/)

Nuclear warfare is still counted as WMD, yet the WMD Commission is more afraid of anthrax or Botox.  Weapons of Mass Destruction used to include chemical warfare, but no longer.  Fretting about nerve gas turned out to be a less lucrative fear-mongering industry than lobbying for juicy biological research grants, and for mountainous stockpiles of vaccines and antiviral drugs. "Especially troubling," says the Commission, "is the lack of priority given to the development of… new vaccines, drugs, and production processes required to meet the modern threats from man-made and naturally occurring epidemics."  Priority means an extra $17 billion of deficit spending over five years.   But notice how "naturally occurring epidemics" were snuck into a report ostensibly dealing with terrorist weapons.  Alleged sources of a bioterrorist threats "include the bacteria that cause anthrax and plague, the viruses that cause smallpox and Ebola hemorrhagic fever, and poisons of natural origin such as ricin and botulinum toxin."   The Commission knows those agents are far less credible terrorist weapons than bombs, guns, airplanes and arson.  (Anyone who tries to kill you with Ebola would die trying). So they are stuck with anthrax, claiming "a bioterrorist attack involving anthrax bacterial spores [is] the most likely near-term biological threat to the United States."  Billions were wasted because of anthrax in 2001, and the Commission is determined to waste billions more.  For those receiving federal loot, Bruce Ivins was a gift that keeps on giving. The Commission report said, "The 2001 anthrax mailings were not the first incident of bioterrorism in the United States. In 1984, the Rajneeshees, a religious cult in Oregon, sought to reduce voter turnout and win control of the county government in an upcoming election by temporarily incapacitating local residents with a bacterial infection. In . . . September 1984, cult members contaminated 10 restaurant salad bars in a town in Oregon with salmonella, a common bacterium that causes food poisoning. The attack sickened 751 people, some seriously." Sickened seriously!  If that isn’t WMD, what is?  "A decade later," the report goes on, "members of a Japanese doomsday cult called Aum Shinrikyo released anthrax bacterial spores from the roof of a building in Tokyo. Fortunately, this attack failed. . . Had Aum succeeded in acquiring a virulent strain and delivered it effectively, the casualties could have been in the thousands."   That is illiterate nonsense. There is no effective way of dispersing anthrax from the roof of a building.  Lacking evidence, the WMD lobby dreams up scenarios. The report tells us White House insecurity experts "created a chilling scenario of how terrorists could launch an anthrax attack in the United States [with] a single aerosol attack in one city delivered by a truck using a concealed improvised spraying device."    This "chilling scenario" is science fiction. In "WMD Doomsday Distractions,"an April 2005 column available at Cato.org, I explained that, "Scenario spinners speculate about mixing anthrax with water and somehow spraying it (without detection) from trucks, crop dusters or unmanned aircraft. But to die from anthrax, you need to inhale thousands of spores. Those spores clump together and mix with dust, yet they must end up neither too large nor too small, or else they would be sneezed out, coughed up or swallowed. Even if enough particles of the perfect size could be sprayed into the breezes, the odds are extremely low of infecting more than few dozen people that way. And none would die if they took Cipro promptly." Tallying up all of the world’s bioterrorism attacks to date, the final score is five killed from anthrax, plus one Bulgarian assassinated by being injected with ricin.  That brings the world total of bioterrorist fatalities up to half a dozen — a bizarre concept of "mass destruction," and a feeble excuse for dispensing billions more federal dollars to those using scare tactics to raid the empty Treasury.

## AT: U.S./Cuban Relations

#### Multiple alt causes

Lee ’13 (Brianna, Senior Production Editor at CFR, U.S.-Cuba Relations, Updated: 1/31/13,

<http://www.cfr.org/cuba/us-cuba-relations/p11113#p5>)

What is the main obstacle in U.S.-Cuban relations?

A fundamental incompatibility of political views stands in the way of improving U.S.-Cuban relations, experts say. While experts say the United States wants regime change, "the most important objective of the Cuban government is to remain in power at all costs," says Felix Martin, an assistant professor at Florida International University's Cuban Research Institute. Fidel Castro has been an inspiration for Latin American leftists such as Venezuelan President Hugo Chávez and Bolivian President Evo Morales, who have challenged U.S. policy in the region.

What are the issues preventing normalization of U.S.-Cuba relations?

Experts say these issues include:

Human rights violations. In March 2003, the Cuban government arrested seventy-five dissidents and journalists, sentencing them to prison terms of up to twenty-eight years on charges of conspiring with the United States to overthrow the state. The Cuban Commission for Human Rights and National Reconciliation, a Havana-based nongovernmental group, reports that the government has in recent years resorted to other tactics besides prison --such as firings from state jobs and intimidation on the street-- to silence opposition figures. A 2005 UN Human Rights Commission vote condemned Cuba's human rights record, but the country was elected to the new UN Human Rights Council in 2006.

Guantanamo Bay. Cuba indicated after 9/11 that it would not object if the United States brought prisoners to Guantanamo Bay. However, experts such as Sweig say Cuban officials have since seized on the U.S. prison camp--where hundreds of terror suspects have been detained--as a "symbol of solidarity" with the rest of the world against the United States. Although Obama ordered Guantanamo to be closed by January 22, 2010, the facility remains open as of January 2013, and many analysts say it is likely to stay in operation for an extended period.

Cuban exile community. The Cuban-American community in southern Florida traditionally has heavily influenced U.S. policy with Cuba. Both political parties fear alienating a strong voting bloc in an important swing state in presidential elections.

#### Proves relations are resilient

Haven ’13 (Paul, Under the radar, Cuba and U.S. often work together, 4/13/13,

http://www.ajc.com/news/news/national/under-the-radar-cuba-and-us-often-work-together/nXK7Q/)

Cuba and the United States may be longtime enemies with a bucket list of grievances, but the fast return of a Florida couple who fled U.S. authorities with their two kidnapped children in tow shows the Cold War enemies are capable of remarkable cooperation on many issues. Indeed, diplomats and observers on both sides of the Florida Straits say American and Cuban law enforcement officers, scientists, disaster relief workers, Coast Guard officials and other experts work together on a daily basis, and invariably express professional admiration for each other. “I don’t think the story has been told, but there is a real warmth in just the sort of day-to-day relations between U.S. and Cuban government officials,” said Dan Whittle, who frequently brings scientific groups to the island in his role as Cuba program director for the Environmental Defense Fund. “Nearly every time I talk to American officials they say they were impressed by their Cuban counterparts. There really is a high level of mutual respect.” Almost none of these technical-level interactions make the headlines, but examples are endless. Just last week, Cuba’s top environmental official Ulises Fernandez and several island oil experts attended a conference in New York of the International Association of Drilling Contractors after the State Department expedited their visas. And in March, Cuba’s leading weatherman, Jose Rubiera, traveled to North Carolina on a fast-track visa to give a talk about hurricane evacuation procedures. Last year’s Hurricane Sandy, which slammed Cuba’s eastern city of Santiago before devastating the northeastern United States, was a cruel reminder that nature cares not about man’s political squabbles. The American government maintains a Coast Guard representative in Cuba, and the two countries work together to interdict suspicious boats. A U.S. diplomat involved in the process said security officials on both sides are on a first-name basis, and that the Cubans happily accept FBI and Coast Guard baseball caps as gifts. He and other diplomats spoke on condition of anonymity because they were not authorized to discuss bilateral issues publicly, but all said they had noticed a thaw in daily interactions that belies the subzero temperatures that characterize official relations. The two countries have been at odds since shortly after Fidel Castro’s rebels marched into Havana in January 1959 and began to set up a Communist state. More recently, the countries have been locked in confrontation over the fate of jailed American contractor Alan Gross, who the Cubans want to exchange for five of their intelligence agents sentenced to long jail terms in the U.S. Angry barbs between Havana and Washington on issues such as democracy, human rights and sovereignty are still the norm, and even delivering each other’s mail is a challenge. The countries, separated by just 90 miles of warm Caribbean seas, long ago ended direct service. But Carlos Alzugaray, a former Cuban diplomat, said Cuba has in recent years taken a pragmatic approach, more often than not cooperating on drug enforcement and judicial issues, something he hoped would one day lead to better ties. “It is important to highlight … that in judicial matters there is a willingness to cooperate and that could open a path to other types of cooperation,” he said, citing the Hakkens as a case in point. Cuba is believed to harbor dozens of American fugitives from the 1960s and 1970s, many of them veterans of domestic militant groups like the Black Panthers. But Havana has clearly shown in recent years that it has no interest in becoming a refuge for common criminals — deporting suspected murderers, child molesters and kidnappers who were foolish enough to think they would be beyond U.S. law enforcement’s reach. Joshua Michael Hakken is accused of kidnapping his young sons from the custody of his in-laws and then sailing with them and his wife to Havana. Cuba promptly informed the State Department of the Hakkens’ weekend arrival, and worked with U.S. officials to send the family home swiftly. Both sides praised the joint effort. “We would like to express our appreciation to the Cuban authorities for their extensive cooperation to resolve this dangerous situation quickly,” the U.S. Interests Section in Havana, which Washington maintains instead of an embassy, said in a statement.

#### No risk of US-Russia War

**Ball 5** (Desmond, Professor – Strategic Defense Studies Centre at Australian National University, “The Probabilities of ‘On the Beach’ Assessing Armageddon Scenarios in the 21st Century, May, <http://www.manningclark.org.au/papers/se05_ball.html>)

The **prospects of a nuclear war between the U**nited **S**tates **and Russia must now be deemed** fairly **remote**. **There are now no geostrategic issues that warrant nuclear competition and no inclination in either** Washington or Moscow **to provoke** such issues. US and Russian **strategic forces have been taken off** day-to-day **alert and** their **ICBMs ‘de-targeted’, greatly reducing** the **possibilities of war by accident,** inadvertence **or miscalculation**. On the other hand, while the US-Russia strategic competition is in abeyance, there are several aspects of current US nuclear weapons policy which are profoundly disturbing. In December 2001 President George W. Bush officially announced that the United States was withdrawing from the Anti-Ballistic Missile (ABM) Treaty of 1972, one of the mainstays of strategic nuclear arms control during the Cold War, with effect from June 2002, and was proceeding to develop and deploy an extensive range of both theatre missile defence and national missile defence (NMD) systems. The first anti-missile missile in the NMD system, designed initially to defend against limited missile attacks from China and North Korea, was installed at Fort Greely in Alaska in July 2004. The initial system, consisting of sixteen interceptor missiles at Fort Greely and four at Vandenberg Air Force in California, is expected to be operational by the end of 2005. The Bush Administration is also considering withdrawal from the Comprehensive Test Ban Treaty and resuming nuclear testing. (The last US nuclear test was on 23 September 1992). In particular, some key Administration officials believe that testing is necessary to develop a ‘new generation’ of nuclear weapons, including low-yield, ‘bunkerbusting’, earth-penetrating weapons specifically designed to destroy very hard and deeply buried targets (such as underground command and control centres and leadership bunkers).

## AT: Water Add-on

#### **Ogallala Aquifer will dry up inevitably- alt causes**

Snyder, 13

[Michael- B.S. in Commerce Univ. of Virginia, J.D. Univ. of Florida, “30 facts about the coming water crisis that will change the lives of every person on the planet,” March 4th, 2013, http://theeconomiccollapseblog.com/archives/30-facts-about-the-coming-water-crisis-that-will-change-the-lives-of-every-person-on-the-planet]

The world is rapidly running out of clean water. Some of the largest lakes and rivers on the globe are being depleted at a very frightening pace, and many of the most important underground aquifers that we depend on to irrigate our crops will soon be gone. At this point, approximately 40 percent of the entire population of the planet has little or no access to clean water, and it is being projected that by 2025 two-thirds of humanity will live in "water-stressed" areas. But most Americans are not too concerned about all of this because they assume that North America has more fresh water than anyone else does. And actually they would be right about that, but the truth is that even North America is rapidly running out of water and it is going to change all of our lives. Today, the most important underground water source in America, the Ogallala Aquifer, is rapidly running dry. The most important lake in the western United States, Lake Mead, is rapidly running dry. The most important river in the western United States, the Colorado River, is rapidly running dry. Putting our heads in the sand and pretending that we are not on the verge of an absolutely horrific water crisis is not going to make it go away. Without water, you cannot grow crops, you cannot raise livestock and you cannot support modern cities. As this global water crisis gets worse, it is going to affect every single man, woman and child on the planet. I encourage you to keep reading and learn more.¶ The U.S. intelligence community understands what is happening. According to one shocking government report that was released last year, the global need for water will exceed the global supply of water by 40 percent by the year 2030...¶ This sobering message emerges from the first U.S. Intelligence Community Assessment of Global Water Security. The document predicts that by 2030 humanity's "annual global water requirements" will exceed "current sustainable water supplies" by forty percent.¶ Oh, but our scientists will find a solution to our problems long before then, won't they?¶ But what if they don't?¶ Most Americans tend to think of a "water crisis" as something that happens in very dry places such as Africa or the Middle East, but the truth is that almost the entire western half of the United States is historically a very dry place. The western U.S. has been hit very hard by drought in recent years, and many communities are on the verge of having to make some very hard decisions. For example, just look at what is happening to Lake Mead. Scientists are projecting that Lake Mead has a 50 percent chance of running dry by the year 2025. If that happens, it will mean the end of Las Vegas as we know it. But the problems will not be limited just to Las Vegas. The truth is that if Lake Mead runs dry, it will be a major disaster for that entire region of the country. This was explained in a recent article by Alex Daley...¶ Way before people run out of drinking water, something else happens: When Lake Mead falls below 1,050 feet, the Hoover Dam's turbines shut down – less than four years from now, if the current trend holds – and in Vegas the lights start going out.¶ Ominously, these water woes are not confined to Las Vegas. Under contracts signed by President Obama in December 2011, Nevada gets only 23.37% of the electricity generated by the Hoover Dam. The other top recipients: Metropolitan Water District of Southern California (28.53%); state of Arizona (18.95%); city of Los Angeles (15.42%); and Southern California Edison (5.54%).¶ You can always build more power plants, but you can't build more rivers, and the mighty Colorado carries the lifeblood of the Southwest. It services the water needs of an area the size of France, in which live 40 million people. In its natural state, the river poured 15.7 million acre-feet of water into the Gulf of California each year. Today, twelve years of drought have reduced the flow to about 12 million acre-feet, and human demand siphons off every bit of it; at its mouth, the riverbed is nothing but dust.¶ Nor is the decline in the water supply important only to the citizens of Las Vegas, Phoenix, and Los Angeles. It's critical to the whole country. The Colorado is the sole source of water for southeastern California's Imperial Valley, which has been made into one of the most productive agricultural areas in the US despite receiving an average of three inches of rain per year.¶ Are you starting to get an idea of just how serious this all is?¶ But it is not just our lakes and our rivers that are going dry.¶ We are also depleting our groundwater at a very frightening pace as a recent Science Daily article discussed...¶ Three results of the new study are particularly striking: First, during the most recent drought in California's Central Valley, from 2006 to 2009, farmers in the south depleted enough groundwater to fill the nation's largest human-made reservoir, Lake Mead near Las Vegas -- a level of groundwater depletion that is unsustainable at current recharge rates.¶ Second, a third of the groundwater depletion in the High Plains occurs in just 4% of the land area. And third, the researchers project that if current trends continue some parts of the southern High Plains that currently support irrigated agriculture, mostly in the Texas Panhandle and western Kansas, will be unable to do so within a few decades.¶ In the United States we have massive underground aquifers that have allowed our nation to be the breadbasket of the world. But once the water from those aquifers is gone, it is gone for good. That is why what is happening to the Ogallala Aquifer is so alarming. The Ogallala Aquifer is one of the largest sources of fresh water in the world, and U.S. farmers use water from it to irrigate more than 15 million acres of crops each year. The Ogallala Aquifer covers more than 100,000 square miles and it sits underneath the states of Texas, New Mexico, Oklahoma, Colorado, Kansas, Nebraska, Wyoming and South Dakota. Most Americans have never even heard of it, but it is absolutely crucial to our way of life. Sadly, it is being drained at a rate that is almost unimaginable.

## AT: Solvency

#### **Sugar ethanol industry development is super slow---years before they have a chance to solve advantages**

Specht 13

[Jonathan-J.D. Wash. U St. Louis, Legal Advisor, “Raising Cane: Cuban Sugarcane Ethanol’s Economic and Environmental Effects on the United States,” Environmental Law & Policy Journal, Univ. of California Davis, Vol. 36:2, <http://environs.law.ucdavis.edu/issues/36/2/specht.pdf>]

Like all new capitalist industries to emerge in the post-Castro era, whatever ethanol industry arises will have to deal with the painful transition from socialism to capitalism. The Cuban sugarcane ethanol industry will face similar challenges to other private sector industries that arise in the post-Fidel era. One of these challenges will be simply a lack of people with skills necessary for any industry. According to Edward Gonzalez and Kevin McCarthy of the RAND Corporation, "As a result of 40-plus years of communism, the labor force lacks the kinds of trained managers, accountants, auditors, bankers, insurers, etc., that a robust market economy requires." n53 While these challenges will not be unique to Cuba's ethanol industry, they will put the country at a competitive disadvantage vis-a-vis existing ethanol exporters such as Brazil. This will be especially true if there is a significant lag time between the expiration of the ethanol tariff barriers at the end of 2011 and the eventual removal of the United [\*181] States trade embargo against Cuba.¶ Additionally, because Cuba's ethanol industry is currently almost non-existent, it will need a great deal of foreign expertise and investment to get started. However, such investments are unlikely to be made unless Cuba makes fundamental changes in its business climate. In the words of Gonzalez and McCarthy, "Capital investment, which Cuba's economy desperately needs and which is most likely to be supplied by foreign investors, will be difficult to attract without enforceable contracts, access to neutral adjudication of disputes, and a degree of predictability that has heretofore been lacking." n54 Any post-Castro government will likely begin to make such changes to increase the appeal of the island nation to foreign investment. However, implementing these changes will take time and trial and error, which will slow the creation of a sugarcane-based ethanol industry.

## Sugar Ethanol Bad

### Generates pollution

#### Sugarcane ethanol generates more pollution than previously thought

Campbell, Spak, and Carmichael 11 (J. E. Campbell, S.N. Spak, G. R. Carmichael, UI College of Engineering alumni, an assistant professor with joint appointments in the UI Public Policy Center, School of Urban and Regional Planning, and the UI College of Engineering Department of Civil and Environmental Engineering, “Sugarcane ethanol in Brazil a substantial pollution source”, Western Farm Press, an industry trade magazine that provides growers and agribusiness with in-depth coverage of the region's major crops plus the legislative, environmental and regulatory issues that affect their businesses, 12/29/11, http://westernfarmpress.com/government/sugarcane-ethanol-brazil-substantial-pollution-source//HZ)

University of Iowa researchers and their colleagues have shown that ethanol fuel producers in Brazil — the world's top producer of ethanol from sugarcane as an alternative to petroleum-based fuel — generate up to seven times more air pollutants than previously thought.¶ The study, titled "Increased estimates of air-pollution emissions from Brazilian sugarcane ethanol," is featured in the Nature Highlights section and published in the Dec. 11 advance online publication of the journal Nature Climate Change.¶ The research team used agricultural survey data from Brazil to calculate emissions of air pollutants and greenhouse gases from the entire production, distribution, and lifecycle of sugarcane ethanol from 2000 to 2008.¶ The estimated pollutants were 1.5 to 7.3 times higher than those from satellite-based methods, according to lead author Elliott Campbell of the University of California, Merced.¶ Greg Carmichael, Karl Kammermeyer Professor of Chemical and Biochemical Engineering in the UI College of Engineering and co-director of the Center for Global and Regional Environmental Research (CGRER), and UI assistant professor Scott Spak note that the findings reflect continued practices and trends that are a part of the production of sugarcane ethanol. These include the practice of burning sugarcane fields before harvest, as well as the fact that sugarcane production in Brazil continues to grow.¶ "We found that the vast majority of emissions come from burning the sugarcane fields prior to harvesting, a practice the Brazilian government has been moving to end," says Spak. "However, the sugarcane industry has been expanding rapidly and moving into more remote areas, which makes it much more difficult to enforce new regulations over this growing source of air pollution and greenhouse gases.¶ "As people try to determine how to integrate biofuels into the global economy, Brazilian sugarcane ethanol has often been considered a more environmentally friendly fuel source than U.S. corn ethanol. In fact, the U.S. Environmental Protection Agency considers sugarcane ethanol an 'advanced biofuel' with fewer greenhouse gas emissions than conventional biofuels like corn ethanol. These new findings help us refine those estimates and move closer to making more informed comparisons between different fuel sources, and ultimately make better decisions about how to grow and use biofuels," Spak says.¶ In addition to Campbell, Carmichael, and Spak, co-researchers include C.C. Tsao and Y. Chen of the University of California, Merced, and Marcelo Mena-Carrasco of Universidad Andrés Bello, Santiago, Chile.¶ Campbell and Mena are UI College of Engineering alumni. Spak is an assistant professor with joint appointments in the UI Public Policy Center, School of Urban and Regional Planning, and the UI College of Engineering Department of Civil and Environmental Engineering.

#### Sugarcane mills lead to high levels of air pollution

Eudel Eduardo Cepero ’04 (“ENVIRONMENTAL CONCERNS

FOR A CUBA IN TRANSITION” CTP, Cuba Transition Project, published 2004, <http://ctp.iccas.miami.edu/Research_Studies/ECepero.pdf>)

Air. Cuba’s precarious air quality is nothing new. Available statistics¶ report a dramatic 43 percent rise in the incidence of acute respiratory diseases in the past 15 years. A study conducted in mid-2001, in Havana’s¶ so-called historic sector, revealed that the readings of sedimented dust in¶ several points of this area surpassed the limits established by the World¶ Health Organization. The study indicated, moreover, that the chloride and¶ sulfur dioxide contents were also very high in that neighborhood of¶ Cuba’s capital, where a large concentration of the population live in¶ cramped quarters. ¶ The poor air quality of several Cuban cities is generally due to local¶ pollution from industrial facilities, such as sugar cane industries, cement¶ factories, thermoelectric plants, hospital crematoriums, automobiles, and¶ so on. A typical case is Moa, where toxic gases and dust from the nickel¶ plants on the outskirts of the city cause acute respiratory diseases in the¶ inhabitants. The residents of Moa suffer from the sharp ammonia odor, as¶ 18the nickel industry lacks the treatment systems needed to avoid the strong¶ pollution that it causes in the area.¶ Improving air quality in the major cities must become an urgent task,¶ given the direct relationship between air pollution and the health of citizens. Probably the best way to begin to control the problem is to establish¶ a basic regulation that indicates which gases cannot be released into the¶ atmosphere, the quantities of those that may be released, as well as the¶ permissible amounts of suspended dust and particles. Future local and¶ municipal governments, due to their proximity to sources of pollution and¶ those affected by it, must play an important role in enforcing the rules and¶ in handling the claims to eliminate the problem.

### Studies Prove Eco-damage

#### **Sugarcane ethanol is harmful to the environment- new studies prove**

**Spak and Carmichael 11**, Scott, and Greg Carmichael. researchers at the University of Iowa."Study Shows Sugarcane Ethanol Production Causes Air Pollution." University of California, Merced. N.p., 15 Dec. 2011. Web. 03 July 2013. <http://www.ucmerced.edu/news/study-shows-sugarcane-ethanol-production-causes-air-pollution>.¶ MA

The burning of sugarcane fields prior to harvest for ethanol production can create air pollution that detracts from the biofuel’s overall sustainability, according to research published recently by a team of researchers led by scientists at the University of California, Merced.¶ UC Merced graduate student Chi-Chung Tsao was the lead author on the paper and was aided in the study by UC Merced professors [Elliott Campbell](http://www.ucmerced.edu/faculty/directory/j-elliott-campbell) and [Yihsu Chen](http://www.ucmerced.edu/faculty/directory/yihsu-chen). The study — published online this week in the [Nature Climate Change](http://www.nature.com/nclimate/index.html) journal — focused on Brazil, the world’s top producer of sugarcane ethanol and a possible source for U.S. imports of the alternative fuel.¶ “There is a big strategic decision our country and others are making, in whether to develop a domestic biofuels industry or import relatively inexpensive biofuels from developing countries,” Campbell said. “Our study shows that importing biofuels could result in human health and environmental problems in the regions where they are cultivated.”¶ Ethanol is seen as an alternative to fossil fuels, which emit greenhouse gasses when used and are a major contributor to air pollution and climate change. But despite some governments encouraging farmers to reduce field burning — which is done in part to protect farmworkers by removing sharp leaves and harmful animals — more than half of sugarcane croplands in Brazil continue to be burned.¶ That leads to a reduction in air quality that can offset the benefits of ethanol over petroleum fuels that emit more greenhouse gases during their use, something Campbell said the U.S. should consider when determining whether to import inexpensive ethanol from Brazil or continuing to invest in domestic corn ethanol production.¶ “Unlike petroleum production, the potential to produce biofuels is relatively evenly distributed across many countries, and this is a big plus from an energy security perspective,” Campbell said. “However, agriculture practices in some regions result in biofuels that lead to even more intense air pollution than petroleum.”¶ Satellites are currently used to measure air pollution in Brazil, but the study shows actual pollution caused by sugarcane field burning could be four times greater than satellite estimates. The researchers believe this is due to the relatively small scale of individual fires.

#### Burning sugarcane produces 10 times the pollution of fossil fuels

Nova 12 (Joanne Nova, a science presenter, writer, and speaker; author of The Skeptic's Handbook, “Sugar cane ethanol biofuel produces 10 times the pollution of gasoline and diesel”, JoNova, a blog that focuses on the science, funding and politics related to anthropogenic global warming, 7/22/12, http://joannenova.com.au/2012/07/sugar-cane-ethanol-biofuel-produces-10-times-the-pollution-of-gasoline-and-diesel//HZ)

Indur Goklany calculated that biofuels policies killed nearly 200,000 people in 2010 alone. That was before this study showed things may be worse than we suspected.¶ Brazil is the largest sugar cane ethanol producer in the world, but people are burning four times the area of sugar cane plantations than previously realized, and it’s producing far more pollution than they thought. For every unit of energy generated, the ethanol-biofuel use produces a lot less CO2 (plant fertilizer) but more volatile organic compounds (VOC’s), more carbon monoxide, more nitrous oxides, as well as more sulphur dioxides. (See Graph b below).¶ Compared to gasoline and diesel, over its whole life cycle, every unit of energy produced with sugar cane produces 10 times as much volatile organic compounds (VOC’s), carbon monoxide, and nitrous oxides. The amount PM10’s and PM2.5’s produced with ethanol fuels is even higher. Most of the pollution comes from burning fields of sugar cane (see graph a). Hence the people suffering the most from ethanol production will be villagers and rural farmers living near areas of sugar cane production. While there have been efforts to encourage farmers to produce cane without burning fields, over half of sugar-cane crop loads continue to be burned. Presumably there is a cost to producing sugar cane without burning. Perhaps sugar-cane production is viable and competitive without burning but this study does not discuss the reasons farmers prefer to burn fields.¶ If you care about pollution, and want less of it, and you care about the health of people in developing countries then clearly we should encourage gasoline and diesel use, and discourage production of ethanol that involves burning sugar cane-fields.¶ Likewise, to promote growth in the Amazon (by increasing CO2 levels), we ought to be burning fossil fuels and not fields of cane.¶ If global policies devalue concentrated energy underground and prize diffuse photosynthetic sources of energy above ground, will we protect and retain dirty rocks deep below the surface at the expense of biodiversity and health of plants and people? It seems so.

#### Sugarcane harvests causes No2 emissions

**MARTINELLI and FILOSO 2008** (MARTINELLI, LUIZ: professor of ecology and geochemistry at the University of São Paulo in Brazil. the Ecological Society of America: "EXPANSION OF SUGARCANE ETHANOL PRODUCTION IN BRAZIL: ENVIRONMENTAL AND SOCIAL CHALLENGES." Texas A&M University <http://www.tamu.edu/faculty/tpd8/BICH407/Brazilenvsoc2.pdf>.)

Like most annual crops, sugarcane requires the application of fertilizer to support an economically viable production. In contrast to developed countries, over-fertilization and consequent losses of excess nutrients to aquatic systems have not been a major environmental problem in Brazil. However, the recent expansion of agriculture in the country coincides with a rapid increase in the consumption of fertilizer (ANDA 2006). The single largest annual crop in Brazil is soybeans, covering ;23 million ha of the 64 million ha of arable land in the country. Maize and sugarcane are grown on 13 and 7 million ha, respectively. While soybeans do not require application of N fertilizer, ;3.25 million tons of fertilizers (including nitrogen, phosphorus, and potassium) were applied to cornﬁelds and ;3.13 million tons of fertilizers to sugarcane ﬁelds in Brazil in 2006. **Therefore, much of this boost in the use of fertilizer in Brazil is attributed to the expansion and intensiﬁcation of sugarcane production.** **As more fertilizer is used in sugarcane crops, excess nutrients are likely to accumulate in the environment.** Because of the high mobility of N, much of the excess is transported to aquatic systems. Excess nitrogen in agricultural ﬁelds has increased the export of N in streams and rivers worldwide and is one of the main causes of eutrophication of coastal waters and estuaries (Howarth 2005). In Brazil, eutrophication of dams and reservoirs are also related to increased inputs of reactive N to landscapes (Matsumura-Tundisi and Tundisi 2005). **Nitrogen fertilizer is applied to sugarcane crops** in Brazil at a rate of 80–100 kg . When compared to average amounts applied to annual crops in developed countries like the United States (140–160 kg ) and The Netherlands (300 kg N and also in comparison to other important crops in Brazil like coffee and citrus, application in sugarcane ﬁelds is not considered excessive. **Yet signiﬁcant amounts of N from fertilizer can be lost to the environment in moist tropical and subtropical regions if application is poorly timed** (Harmand et al. 2007). In addition, most of the N fertilizer in Brazil is applied in the form of urea (CO(NH2 (Cantarella 1998), and can easily be lost through volatilization of ammonia (NH3) or during nitriﬁcation. Volatilization from soils occurs when urea is transformed into ammonium carbonate through the action of urease, an enzyme that catalyzes urea hydrolysis. Under speciﬁc conditions (high temperatures and high pH), ammonium carbonate is transformed into NH3 and emitted to the atmosphere. Emission of N2 O occurs when NH3 is oxidized into NH4 , which is then nitriﬁed into NO2. Several studies have shown that the use efﬁciency of fertilizer N by sugarcane crops in Brazil is rather low. On average, only ;20–40% of the N applied to sugarcane is assimilated in plant tissues, including roots, stalk, leaves, and tip (Oliveira et al. 2000, Trivelin et al. 2002, Basanta et al. 2003, Gava et al. 2005). **Therefore, for every 100 kg N/ha applied to sugarcane ﬁelds, between 60 and 80 kg N/ha stays in the soil. Depending on soil and climate conditions, different fractions of this N in the soil are lost via volatilization, denitriﬁcation, erosion, and surﬁcial water runoff, or assimilated later by sugarcane ratoons that will sprout in the next crop season** (Trivelin et al. 1995, 1996, 2002, Cantarella 1998, Oliveira et al. 2000, Gava et al. 2001, 2005, Basanta et al. 2003). Leaching to groundwater also occurs, and ranges from 5 to 15 kg , depending on soil characteristics (Oliveira et al. 2002). **Tracer experiments used to determine the fate of fertilizer 15N within sugarcane revealed that 10% or 20% of the total fertilizer N applied to crops is assimilated in the stalks, which is the part actually used in the industry, while another 10–20% ends up in other aerial parts of the plant such as the tips and straw, which are either burned or decomposed in the ﬁeld** (Oliveira et al. 2000, Gava et al. 2001, 2005, Basanta et al. 2003). **Based on these values, an estimated 10–20 kg N/ha of the fertilizer N applied to crops is transported to the mills in the sugarcane stalks for production of ethanol and sugar, while the remainder stays in the ﬁeld or is emitted to the atmosphere.** Eventually, even the relatively small amount of N transported to the mills is recycled back into the ﬁelds, because byproducts from sugarcane processing such as vinasse are used to fertilize and irrigate crops. Large losses of N from sugarcane ﬁelds occur not only because of the relatively low use efﬁciency of N fertilizer by the plant, but also via ammonia volatilization during plant senescence due to the high evapotranspiration rates of sugarcane, which is characteristic of C4 plants (Trivelin et al. 2002, Costa et al. 2003, Gava et al. 2005). Senescence is responsible for the emission of ;80 kg of N/ha (Trivelin et al. 2002), while volatilization from soils fertilized with N amount to 30–40% of the fertilizer applied, or 30–40 kg of N/ha, assuming a fertilizer application rate of 100 kg N/ha. Therefore, total gaseous losses from volatilization in sugarcane crops are an estimated 110 kg (80þ30 kg) to 120 kg (80þ40 kg) of N/ha annually. **Although the soil organic matter reservoir is an additional source of reactive N, biological ﬁxation may supply an important amount of reactive N. In Brazil, several varieties of sugarcane are able to ﬁx N biologically in symbiosis with endophytic bacteria located in roots and foliage tissues** (Boddey et al. 2001). Depending on environmental conditions, ﬁxation by Brazilian sugarcane varieties is a maximum of 150 kg ha , with in situ rates averaging between 30 and 50 kg (S. Urquiaga, personal communication).

### Emits C02

#### Sugarcane burning emits CO2 and NOx

NCGA 11 (NCGA, National Corn Growers Association, “Sugarcane as a Feedstock for Biofuels: An Analytical White Paper”, National Corn Growers Association, an association that represents the interests of corn growers, 7/15/11, http://www.ncga.com/upload/files/documents/pdf/sugarcanewhitepaper092810.pdf//HZ)

Burning of sugarcane is a major issue (Fig. 7). Burning is an effective method to remove the excess crop biomass that arises from the leaves, small tillers, and stalk tips (called trash). This fraction makes up about 14 percent of the sugarcane crop weight in the field. Trash is a restriction at harvest (for both hand-harvesting and mechanical), results in more costly transport, and can absorb the sugar juice during crushing with a negative effect on recoverable sugar.¶ Burning a sugarcane field releases a considerable amount of CO2 with estimates varying from 2,600 – 4,500 Kg CO2/Ha. In some models, such as GREET as used by CARB, a small amount of carbon release from burning is included in the sugarcane ethanol assessment, and the Brazilian Sugarcane Association wants that to be reduced (UNICA2, 2009). The questions remain as to what is the exact amount of CO2 emissions used by the EPA, and what is the appropriate realistic number to include.¶ Burning sugarcane also results in NOx emissions and, again, the exact amount is somewhat unclear although some reports indicate measured NOx emissions in the order of 25 Kg (N)/Ha (22 lb (N)/acre): this is reported to be about 30 percent of the N fertilizer applied to sugarcane (Oppenheimer et al, 2004).¶ In addition to the CO2 and NOx emissions per unit area, there is a large area of cane that is burnt. The Sao Paulo area, in the Central South region, produces about 60 percent of the sugarcane, has higher yields and more modern technologies, yet cane burning covers 8,000 sq. miles or equivalent to ~5 MM acres in this area alone. UNICA makes the point that a considerable number of mills have moved to mechanical harvesting, instead of manual sugarcane cutting, and that this will remove the emissions from burning (UNICA2). However, while the more advanced Sao Paulo area now has ~49 percent mechanical harvesting, there is still 69 percent of the harvested cane area being burnt each year: while mechanical harvesting overcomes the necessity for burning, it is still more efficient to harvest mechanically after burning-off the trash. With no burning in the field, the trash will have to be harvested -- at a higher cost, using more energy, with additional transport, just to be combusted into CO2 at the mill in any case.

### Pesticides

#### GMO varieties of sugarcane could lead to herbicide resistant weeds, leads to never-ending arms race of chemical treatment

Lehtonen 09’

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economics University of Versailles Saint-Quentin-en-Yvelines, France, 19 December 2009, Ethical-sugar (An organization that monitors the ethical use of pesticides in the sugar cane industry), “Status report on sugar cane agrochemicals management”, <http://www.sucre-ethique.org/IMG/pdf/agrochemicals_1_.pdf>, DA: 7/3/2013

However, the public opinion in Brazil remains divided on the issue of GMOs. The development of herbicide resistant cane varieties is feared to increase the domination of sugarcane sector by large, vertically integrated conglomerates, thereby excluding small, independent farmers. A concern more specifically related to the theme of this paper is that herbicide-resistant sugarcane grown in large plantations may incite farmers to overuse herbicides, as seems to have happened with the ¶ introduction of herbicide-resistant soy varieties (Joensen 2007).

Finally, the high amounts of herbicide applied may lead to the development of herbicide-resistant ¶ weeds. Such weeds have not yet been found in sugarcane cultivation, but the rapid increase of ¶ herbicide resistance in crops such as soybeans, cotton and corn suggests that this situation may ¶ change (FoE & CFS 2008; Smeets et al. 2008, 785; Center for Food Safety 2008). The industry’s suggestion to combating herbicide-resistant weeds – to genetically engineer a new generation of plants to resist even more toxic and persistent weed killers such as 2,4-D and dicamba (Robinson, E. 2008) – might lead to a never-ending ‘arms race’ between cane breeders who develop evermore herbicide-resistant varieties, and the weeds that respond by developing their own herbicide resistance.

#### Export economies pressure sugarcane- producing developing nations to underpay their workers and use excessive pesticides

Lehtonen 09’

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Pesticide use in the developing countries is intimately linked with the operation of the international agrochemicals markets. Agricultural production in these countries is often polarised between ¶ two sections: one producing cash-crops for the export market and another supplying food for ¶ the domestic market. Only the former is directly subject to pressure from the industrialised world ¶ to reduce chemical residues. By virtue of their significant economic power, multinational agrochemical companies are in a key position to affect agrochemical use in the sugarcane-producing ¶ developing countries. Companies can either aggravate the dependence of sugarcane-producing ¶ developing countries on high-input agriculture, but they can also be a highly positive force in ¶ fostering appropriate use of agrochemicals and alternative management practices, through Corporate Social Responsibility schemes, for example.

Developing countries often lack the required legal and scientific expertise as well as the human ¶ and financial resources needed to conduct risk assessments and to implement and enforce chemicals regulation. Chemicals registration procedures in these countries, when such procedures ¶ exist, often are not based on data on the prevailing local conditions. Instead, assessments draw on ¶ information from the developed world, which tend to make assumptions about ‘best practices’ ¶ and environmental conditions that are unrealistic in the developing world.

This report presents examples of the challenges of agrochemicals use in sugarcane production in ¶ Nicaragua, Fiji, and Brazil in order to illustrate some of the intimate links between agrochemical ¶ use and the dynamics of competition in the world market. The competitiveness of Brazilian sugarcane production is partly based on the low wage labour and modest investment in environmental ¶ protection. However, to ensure continued access to export markets, the country is under increasing pressure to demonstrate adherence to socially and environmentally appropriate production ¶ practices. The problems of inappropriate chemicals use in the Nicaraguan sugarcane production ¶ partly stem from the country’s economic development model driven by agricultural exports, yet ¶ international pressure has not so far been sufficient to ensure effective Corporate Social Responsibility schemes in the country’s sugar sector. The Fijian case shows how the progressive removal of ¶ the EU preferential treatment to the country’s sugar exports has, paradoxically, opened up a ‘niche’ ¶ for environmentally and socially more benign production methods.

Agrochemicals killed 3-5 million people a year in the 90’s, up to 10% fatalities of workers in developing countries

Lehtonen 09’

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While the introduction of agricultural chemicals has allowed spectacular crop yield increases ¶ in practically all areas of agriculture, this progress has not come without cost for human health ¶ and the environment. Inadequate use of agrochemicals is particularly problematic in developing countries, which often lack the sufficient institutional conditions to ensure that these chemicals are used safely, without endangering workers health, or contaminating the environment. The ¶ generally warm and humid climates prevalent in most developing countries tend to aggravate ¶ pest problems and thereby increase the need for agrochemicals use. The institutional problems ¶ are highlighted by the fact that while developing countries consume only 20% of global agrochemicals, as much as 70% of intoxication cases occur in these countries (de Miranda et al. 2007, ¶ 11). The WHO has estimated that, in the 1990s, between three and five million people in the world suffered from agrochemicals contamination each year (de Miranda et al. 2007, 11). ILO (International Labour Organisation) studies suggest that pesticide misuse causes 14% of occupational ¶ injuries in agriculture and, in some countries, as much as 10% of fatalities (Brodesser et al. 2006)

### Environmental Impacts

#### Sugarcane farming has serious ecological impacts

Armando H. Portela, Ph.D. and Benigno E. Aguirre, Ph.D. July 27, 2007

(Armando H. Portela, Ph.D., a geographer from Miami and Benigno E. Aguirre, Ph.D., a sociologist from College Station, Texas “Air and Water Pollution in Cuba” July 27, 2013 <http://havanajournal.com/culture/entry/air-and-water-pollution-in-cuba/>)

Elsewhere, the Cauto River basin is also severely impacted¶ by pollution and environmental degradation (Gonzalez Otero et¶ al., 1989). The basin is the most extensive in the island, with¶ an area equivalent to eight percent of the entire country and¶ 9.3 percent of its agricultural land. One quarter of Cuba’s¶ rice is grown in it; the basin produces one tenth of the¶ national sugar output. The life of every tenth Cuban is¶ directly linked to the basin. The depletion of the¶ environmental quality of the Cauto River basin over the past¶ three or four decades is a serious national problem. The damage¶ covers a broad range of ecological issues:¶ \*One third of the basin suffers from severe erosion.¶ \*Salt-water intrusions have spoiled most of the¶ groundwater reservoirs.¶ \*The natural runoff has been reduced by 60 percent in¶ recent decades.¶ \*The forested areas have been nearly annihilated.¶ A survey of the basin found 652 “pollutant hubs,”¶ including industries, urban sewage systems and cattle farms that¶ produce impressive amounts of untreated waters that contribute¶ to further deterioration.¶ There are critical problems elsewhere too. A recent¶ report (Radio Rebelde, May 17, 1997) pointed out that eight¶ sugar mills in Camaguey province spill up to five cubic meters¶ of untreated waste water per second, or 77.8 million cubic¶ meters during the harvest period. It should be noted that the¶ reservoir capacity of the entire Camaguey province is 361.8¶ million cubic meters, so that only eight of its 14 sugar mills¶ could be polluting as much water in only a few months (Portela,¶ CubaNews, July 1997).¶ A fourth major area of water pollution is the Laguna del¶ Tesoro. It is the largest natural fresh water reservoir on the¶ island. Recent measurements in the Zapata Swamps, where the¶ lake is located, found that the lake water level has dropped 80¶ centimeters (31.5 inches) or roughly one fifth of the average¶ depth of the lake. The loss of water was put at 6.4 million¶ cubic meters (1.7 billion gallons). It is attributable to the¶ demolition of levees and the deepening and widening of channels¶ out of the lake by state owned rice farms located nearby. The¶ rice farms have been draining nearby swamps, which have also¶ reduced the level of the lake. Untreated wastewaters from at¶ least two sugar mills located near the lake are a source of¶ pollution, as are low levels of pesticides and fertilizers from¶ nearby farming operations. This pollution has begun to affect¶ the local fauna, especially the trout population of the lake.¶ The potential economic impact is enormous; after the popular¶ Varadero Beach resort, Laguna del Tesoro is the second most¶ popular tourist destination in Matanzas province (CubaNews,¶ March 1999).

#### Cuban sugarcane industry cases a laundry list of environmental impacts

Patricia Grogg 2003 (Patricia Grogg, staff writer for Inter Press Service, “Environment-Cuba: Sugarcane a culprit in soil depletion,” Aug 28, 2013 <http://www.ipsnews.net/2003/08/environment-cuba-sugarcane-a-culprit-in-soil-depletion/>)

The sugar industry is among the major contributors to the degradation of Cuban soil, a problem affecting nearly 70 percent of cultivable areas on the island. Worldwide, desertification processes cause losses of 42 billion dollars annually.¶ According to official figures, the soils in 11 of Cuba’s 14 provinces suffer from erosion, compaction, acidity, salinity and lack of organic material, but the phenomenon is most dramatic in the east, where the island’s most fragile ecosystems are found.¶ Experts say the main culprit is five centuries of monoculture of sugarcane, a crop that depletes the soil’s nutrients. Sugarcane production intensified in the early 19th century through the mid-20th century.¶ Commercial cultivation of sugarcane and subsequent expansion of cattle raising led to the deforestation of extensive areas, a phenomenon that accelerated in the 19th century with the rise of coffee plantations in the eastern mountains.¶ In less than two centuries, the island lost eight million hectares of tree-covered area, such that by 1959 only 14 percent of Cuban territory was forested.¶ "And that 14 percent which was not appropriate for agricultural use has been suffering an accelerated process of erosion," Antonio Perera, an expert with the United Nations Development Programme (UNDP) told Tierramérica

#### Firewood need for sugarcane mills causes massive deforestation

Eudel Eduardo Cepero ’04 (“ENVIRONMENTAL CONCERNS

FOR A CUBA IN TRANSITION” CTP, Cuba Transition Project, published 2004, <http://ctp.iccas.miami.edu/Research_Studies/ECepero.pdf>)

Deforestation. It is difficult to ascertain accurately how much of¶ Cuba is covered by forests today, because many conflicting estimates¶ have been published. For example, an article that appeared in the¶ Trabajadores weekly in 1997 claimed, “The country’s wooded surface¶ area should amount to 27%. At present, it is 21%.” However, another¶ press article, published in the weekly Juventud Rebelde, said that a spectacular growth in the wooded surface area had occurred by June 2000.¶ This article said, “Currently, 23.4% of Cuba’s total surface area is covered by tree plantings, and in 1959 we only had about 18%.” If, until¶ 1997, the Cuban government recognized a wooded surface area of 2.4¶ million hectares—that is, 21 percent of the archipelago—then this new¶ sum is truly incredible, as it implies a growth of 2.4 percent in just two¶ years, while between 1959 and 1997, a growth of only 3 percent was¶ achieved. ¶ Nevertheless, it is evident that a drastic decrease has occurred in¶ Cuba’s forest surface area. The situation is serious, given the fact that¶ three-fourths or 75 percent of the logging comes from scarce natural¶ forests and not from artificial plantings that are insufficient to meet the¶ nation’s demand for lumber which, among other amounts, annually consumed 1 million cubic meters of firewood in the sugar cane industry alone¶ (Cepero 2000). Forest fires constitute another factor that has an impact on¶ the decrease in wooded areas, since an average of 200 blazes per year¶ occur throughout the country, destroying some 5,000 hectares of forest.¶ There is an extensive list of natural causes and silvicolous conditions that¶ favor these fires, as well as the fact that the forest service is precarious,¶ backward in its methods, and has insufficient human and other resources¶ to safeguard the forests (Cepero 2000). ¶ Considering the foregoing, it is necessary to institute forestry and¶ financial regulations that permit the use, preservation, and recovery of¶ natural forests, such as adequate payments for cutting permits, felling¶ 7prohibitions, and restrictions when deemed necessary, as well as permanent bans on certain species and special taxes for using other species considered scarce, and penalties for violating such forestry regulations as¶ may be established. Also to be considered are financial and tax incentives¶ for those landowners with natural forests who implement self-imposed¶ bans on felling for specific periods of time or who carry out silvicolous¶ practices14 that benefit the forests, and such other incentives as may be¶ deemed useful.

### Health Problems

#### Sugarcane burning causes health problems

NCGA 11 (NCGA, National Corn Growers Association, “Sugarcane as a Feedstock for Biofuels: An Analytical White Paper”, National Corn Growers Association, an association that represents the interests of corn growers, 7/15/11, http://www.ncga.com/upload/files/documents/pdf/sugarcanewhitepaper092810.pdf//HZ)

In addition to environmental issues, health problems have also been associated with the practice of sugarcane burning due to particulates and volatile compounds filling the air. For example, in Piracicaba, Sao Paulo, samples were collected to analyze inhalable particles, and hospital admissions for respiratory problems were examined by Cancado et al (2006). Factors arising from sugarcane burning were statistically significant and highly associated with both child and elderly respiratory admissions. The authors indicate that there is a clear and adverse impact of sugarcane burning emissions on the health of the population.¶ In submissions to the Californian Air Regulations Board (CARB), UNICA has positioned that Brazilian sugarcane ethanol should be given preferential treatment as an advanced biofuel under the RFS rules (UNICA2, 2009). In these submissions, it has been claimed that sugarcane burning is declining and that there are mandates for future restrictions. UNICA claim that their member companies will phase-out burning over the next 5-10 years. The Brazilian regulations for the Sao Paulo region seem to call for sugarcane field burning to be phased-out by 2021 from areas where mechanical harvesting is possible with existing technology, and by 2031 in areas where this may not be possible. Brazilian sugarcane ethanol should be assessed for what it is today, not for what it might be in 12-20 years time.

#### **Field workers in developing countries experience extensive health problems as a result of pesticide use, health problems go unreported and the water systems become polluted**

Lehtonen 09’

Author Dr Markku Lehtonen , Sussex Energy Group University of Sussex, UK - PhD in environmental

economics University of Versailles Saint-Quentin-en-Yvelines, France, 19 December 2009, Ethical-sugar (An organization that monitors the ethical use of pesticides in the sugar cane industry), “Status report on sugar cane agrochemicals management”, <http://www.sucre-ethique.org/IMG/pdf/agrochemicals_1_.pdf>, DA: 7/3/2013

Exposure of field workers to agrochemicals is the main source of health problems associated with ¶ pesticide use in sugarcane production. Workers may become exposed during the application of ¶ the chemicals in the field, the preparation of the chemical mixtures, or the treatment and storage ¶ of seeds and cuttings. Symptoms from acute intoxication include skin and respiratory problems, ¶ bleeding, convulsions, nausea, vomiting, and in the worst cases death. Long-term exposure, in ¶ turn, may increase cancer risk, weaken the immune system, or generate neurological symptoms, ¶ endocrine disruptions, genetic mutations, and behavioural changes.

The type and the extent of health impacts depend not only on the characteristics of the chemicals, but also on factors such as the general health, nutritional status and lifestyle of the individuals exposed to chemicals, on the prevailing environmental and climatic conditions, as well as on ¶ the broader socio-economic context. Health problems caused by pesticide use in the developing ¶ countries often go underreported, for instance because public authorities lack abilities to monitor, ¶ identify and address the problems.

The surface and groundwater pollution as well as soil contamination caused by inappropriate pesticide use also have serious consequences on public health, by exposing the local populations to environmental pollution. Sometimes the objectives of reducing the environmental and health impacts of agrochemicals enter in conflict, such as when environmentally harmful chemicals are replaced by those that are less persistent but more acutely toxic to humans.

### Water Pollution

#### Sugarcane harvests cause aquatic pollution

**MARTINELLI and FILOSO 2008** (MARTINELLI, LUIZ: professor of ecology and geochemistry at the University of São Paulo in Brazil. the Ecological Society of America: "EXPANSION OF SUGARCANE ETHANOL PRODUCTION IN BRAZIL: ENVIRONMENTAL AND SOCIAL CHALLENGES." Texas A&M University <http://www.tamu.edu/faculty/tpd8/BICH407/Brazilenvsoc2.pdf>.)

The negative effects of accelerated soil erosion include not only soil degradation and subsequent poor crop development, but also deterioration of aquatic systems. As colluvium sediments are transported downhill across the landscape from sugarcane ﬁelds, they are deposited onto wetlands, small streams, rivers, and reservoirs. Deposition impacts water quality, ecosystem biodiversity (Politano and Pissarra 2005), and ecosystem functions. An example that illustrates **the problem of sedimentation in aquatic systems linked to sugarcane cultivation** was described by Fiorio et al. (2000) for a small watershed in Piracicaba County, state of Sa˜o Paulo (Fig. 2). This watershed had 25% sugarcane land cover in 1978 when a reservoir was built to supply water for a small town nearby. About 20 years later, almost 70% of the watershed was covered by sugarcane crops, and the reservoir could no longer be used as a water supply because of sedimentation and loss of 50% of its waterholding capacity. In a country like Brazil, where most of the water supply for cities and rural areas and most of the electrical power generated are from dammed rivers and reservoirs, **sedimentation of aquatic systems can have serious consequences. The severity of the problem of sedimentation is aggravated even further by the transport of contaminants such as pesticides and heavy metals used in sugarcane cultivation to aquatic systems.** For instance, organochlorides were found in sediment and ﬁsh samples collected in the Piracicaba River basin in 1997 (Silva et al., in press), despite the fact that the use of this product was forbidden in Brazil in 1985. Similarly, organochlorides were found in samples collected in 2003 in streams that drain a sugarcane region in the central portion of Sa˜o Paulo state (Corbi et al. 2006). This suggests that these compounds are still being used by farmers because the pesticides have a short half-life in the environment. (Silva et al., in press). **Other contaminants such as atrazine, a herbicide used in sugarcane crops, and heavy metals such as copper (Cu), were also found in water samples and stream bed sediments collected in rivers draining regions that have extensive sugarcane cultivation** (Carvalho et al. 1999, Azevedo et al. 2004, Corbi et al. 2006). The industrial processing of sugarcane for production of ethanol and sugar is yet another source of pollution for aquatic systems, as large amounts of byproducts and waste are generated in the mills. The two most important are wastewater generated from the washing of sugarcane stems before they go through the mill, and the vinasse produced during the distillation process. Both of these waste products are rich in organic matter, and therefore increase the BOD (biochemical oxygen demand) of waters receiving these efﬂuents. Elevated BOD promotes depletion of dissolved oxygen in the water and often causes anoxia (Ballester et al. 1999). High nutrient concentrations in these efﬂuents also contribute to the problem by enhancing algal blooms and promoting eutrophication of surface waters (Matsumura-Tundisi and Tundisi 2005). For each liter of ethanol that is produced from sugarcane, 12–13 liters of vinasse are generated. With the boom of ethanol production in Brazil in the early 1980s, new legislation was created to ban the direct discharge of vinasse onto surface waters. Since then, nutrient and carbon-rich vinasse is mixed with wastewater from washing sugarcane and is recycled back to sugarcane ﬁelds as organic fertilizer (Gunkel et al. 2007). This solution has helped to protect aquatic systems to a certain extent. However, it is not uncommon for small mills to discharge vinasse into streams and rivers because they lack the means of transport and application. Also, accidents or mishandling during storage and transport of vinasse are not uncommon, even in mills with adequate infrastructure. In a monitoring study conducted on a small stream adjacent to a sugarcane mill in Piracicaba County, Ometto et al. (2000) reported signiﬁcant changes in water quality along a 1.8-km reach downstream of a sugarcane mill (Fig. 4). Clear increases in water temperature, electrical conductivity, dissolved organic carbon (DOC), and dissolved inorganic nitrogen (DIN) were observed downstream from the mill. Moreover, concentrations of dissolved oxygen were signiﬁcantly lower downstream, while dissolved inorganic carbon (DIC) was higher. Gunkel et al. (2007) reported similar changes along a reach of the Ipojuca River in the northeastern region of Brazil. Martinelli et al. (1999a) used stable isotope techniques to determine the origin of organic matter in rivers draining watersheds that were predominantly covered by sugarcane and found that, in the samples collected, carbon originated from sugarcane. Sugarcane is a C4 plant, which can be easily distinguished from C3 plants (e.g., trees) because of a distinctive isotopic signature (expressed as d 13C). **Therefore, these results suggested that either the discharge of vinasse into streams is substantial in the region, or that accelerated erosion in sugarcane ﬁelds transports organic materials to the water (Martinelli et al. 1999a, 2004). A combination of both scenarios is likely.**

#### **Water impacts of sugarcane production severe**

Moreira 7’ Jose Roberto Moreira of the Brazilian Biofuel Research Center, “Water Use and Impacts Due Ethanol Production in Brazil”, 2007, IWMI (International Water Management Institute) <http://www.iwmi.cgiar.org/EWMA/files/papers/Jose_Moreira.pdf>

Although the type of impacts and the ways to mitigate them are similar for any production site, most of the details in this paper are based on the situation in Sao Paulo State, where CETESB, the Sao Paulo State Environmental Technology and Sanitation Agency, has been very active in reducing the various emissions. Thus, we will discuss water impacts caused by sugar cane crops (contamination of open water systems by agrochemicals and fertilizers, contamination of groundwater by agrochemicals, fertilizer and deposition of liquid and solid ¶ residues on the soil, soil erosion) and for processing the crop to ethanol (Table 11 in Section 3 shows the most important wastewater flows from ethanol production and their pollution potential).

Table 6 lists the most important environmental impacts associated with the production of ethanol. The list is not comprehensive, and there is no order of importance. Impacts listed in  bold are the ones dealing with water use.

Table 6: Environmental impacts of ethanol production from sugar cane

pollution of open water systems by industrial effluents; contamination of open water systems by agrochemicals and fertilizers; contamination of groundwater by agrochemicals, fertilizer and deposition of liquid and solid residues on the soil; soil erosion; pollution of water, air and soil due to accidents with transport and storage of (by)products; air pollution due to bagasse burning; air pollution and inconvenience due to cane and cane residue burning; air pollution and inconvenience due to storage and soil­application of vinasses; proliferation of insects due to vinasses; reduction of visibility on roads due to cane and cane residue burning; deforestation; substitution of food and other cultures; human health effects, for both workers and local population, due to agrochemicals; infrastructure over­use.

Sources: RIMA Batatais 1990,

3.2  Agricultural Aspects,

3.2.1  Monoculture and Use of Agrochemicals and Fertilizers.

The sugar cane production in Brazil involves huge areas of mono­culture. This represents a complete change in the agro­ecosystem, in particular a higher incidence of pests. Therefore, larger amounts of pesticides are being employed, resulting in increased environmental problems and a higher chance of population contamination and/or labour intoxication. These problems may have been minimized by installing smaller­capacity distilleries for smaller plantations. Economies of scale, however, would have been lost to a great extent.

The agrochemicals used in sugarcane cultivation include fertilizer, herbicides, insecticides and fungicides. The required quantities of these chemicals are very site specific. Fertilizer requirements are also very dependent on the  extend of vinasses application to  the soil. Herbicides are used in quantities ranging from 500 to 3000 grams per ha. Insecticide use ranges from 15 to 1000 grams per ha (RIMA Batatais, 1990).

### Soil Pollution

#### Sugarcane harvests cause soil degradation

**MARTINELLI and FILOSO 2008** (MARTINELLI, LUIZ: professor of ecology and geochemistry at the University of São Paulo in Brazil. the Ecological Society of America: "EXPANSION OF SUGARCANE ETHANOL PRODUCTION IN BRAZIL: ENVIRONMENTAL AND SOCIAL CHALLENGES." Texas A&M University <http://www.tamu.edu/faculty/tpd8/BICH407/Brazilenvsoc2.pdf>.)

**Among the major problems linked to sugarcane cultivation is soil degradation caused by erosion and compaction. Soil erosion tends to be high in sugarcane ﬁelds** (Fiorio et al. 2000, Politano and Pissarra 2005) in comparison to pastures and forests because of extensive areas of bare soil that are associated with the management practices used. Bare soils are exposed to intense rain and winds, both during the initial process of land use conversion when grasses are killed to prepare for the planting of sugarcane, then again in the period between crop harvesting and regrowth. **When sugarcane stalks are replaced with new ones every 5–6 years, soils remain bare for several months**. **Soil compaction results from the constant trafﬁc of heavy agricultural machinery associated with cultivation and harvesting operations in sugarcane ﬁelds. The compaction destroys soil** physical properties such as porosity and density, which in turn decreases water inﬁltration and further enhances soil erosion. Sparovek and Schnug (2001) **estimated erosion rates up to 30 Mg of soil for sugarcane ﬁelds** in Sa˜o Paulowhile rates in forests and pastures did not exceed. In one particular region of Sa˜o Paulo, which has been intensively and extensively cultivated **with sugarcane for many decades**, Politano and Pissarra (2005) found that **erosion varied from severe to extremely severe.**

#### Mixing areas for pesticides used on sugar cane mills pollute the soil

HDOH December 2011 ( Hawaii Department of Health “Summary of Pesticide and Dioxin contamination associated with former sugarcane operations” Hazard evaluation and emergency response office, dec. 2011. http://www.hawaiidoh.org/tgm-guidance/Pesticide-Dioxin%20Summary%20(HDOH%20Dec%202011).pdf)

Contamination associated with former pesticide mixings areas by far represent the most significant ¶ concern associated with former sugarcane operations. The majority of the sites investigated are impacted ¶ with dioxins and/or arsenic, depending on the time period that they were in operation. Contamination at ¶ most of the former pesticide mixing areas exceeds soil action levels for unrestricted land and in some ¶ cases exceeds action levels for commercial and industrial land use, without further assessment and ¶ remediation. Examples of the latter include the former pesticide mixing area at Kilauea, Kaua‘i (Site # 9 ¶ in summary tables), the former mixing area in Kohala, Kaua‘i (Site #10 in the summary tables) and the ¶ East Kapolei and Ewa/O‘ahu Sugar Mill pesticide mixing areas on the island of O‘ahu (Sites #28 and #44 ¶ in summary tables).

#### Sugarcane production requires the destruction of native ecosystems which reduces soil carbon more than any other biofuel production

Davis, Masters and Delucia 09’¶ KRISTINA J. ANDERSON-TEIXEIRA\*, SARAH C. DAVIS w , MICHAEL D. MASTERS\*¶ and¶ EVAN H. DELUCIA Energy Biosciences Institute, University of Illinois, Urbana-Champaign, IL 61801, USA, wDepartment of Plant Biology,¶ University of Illinois, Urbana-Champaign, IL 61801, USA, zInstitute of Genomic Biology, University of Illinois,¶ Urbana-Champaign, IL 61801, USA, GCB Bioenergy (2009) 1, 75–96, “Changes in soil organic carbon under biofuel crops” <http://www.life.illinois.edu/delucia/Delucia%20Life%20Science/PUBLICATIONS/GCBB_1001.pdf>, DA: 7/5/2013

Clearing uncultivated land triggered a SOC loss (Figs¶ 1, 3 and 4). This may be attributed to the effects of¶ tillage, which stimulates a release of C from soil (e.g.,¶ Reicosky et al., 1997) or to a deﬁciency of organic inputs¶ relative to decomposition early in crop establishment¶ (Paul et al., 2002). In our analysis, the land conversion loss was most pronounced for sugarcane agriculture¶ (Figs 3 and 4a), as the majority of sites sustained native ecosystems before cultivation (Tables 1, A1). There also¶ was some indication that clearing grassland for cultivation of Miscanthus caused modest land conversion¶ losses (Fig. 4b). These losses should be attributed more to the disturbance of native or restored ecosystems, which consistently reduces SOC (Davidson & Ackerman, 1993; Guo & Gifford, 2002; Murty et al., 2002; West¶ et al., 2004; Zinn et al., 2005), than to the cultivation of¶ any speciﬁc crop. While crop type and agronomic¶ practices may inﬂuence the magnitude of the land¶ conversion loss, these effects cannot be reasonably¶ assessed without side-by-side trials. We emphasize that¶ failure to consider land conversion losses separately¶ from crop-induced SOC changes can severely bias¶ estimates of crop performance (e.g., Figs 1 and 4). There are substantial differences between crops in the¶ ability to sequester SOC; whereas SOC was lost under corn with residue harvest, all four perennial grasses –¶ sugarcane, Miscanthus, switchgrass, and mixed native¶ grasses – sequestered SOC (Figs 2–4). Change in SOC is¶ an integration of the entire C cycle, and several components thereof may differ between crops. First, crop¶ productivity represents the total C that is potentially¶ available for incorporation into soil organic matter.¶ Aboveground productivity estimates are 15.6 Mg¶ ha1¶ yr1¶ for corn (Graham et al., 2007; Petrolia, 2008;¶ World Agricultural Outlook Board, 2008), 50–120 Mg¶ ha1¶ yr1¶ for sugarcane (Cheeseman, 2004), 10–61 Mg¶ ha1¶ yr1¶ for Miscanthus (Lewandowski et al., 2000;¶ Heaton et al., 2008), 9–26 Mg ha1¶ yr1¶ for switchgrass¶ (McLaughlin & Adams Kszos, 2005; Heaton et al., 2008)¶ and 0.5–9 Mg ha1¶ yr1¶ for restored prairie (Knapp et al.,¶ 1993; Briggs & Knapp, 1995; Brye et al., 2002; Tilman¶ et al., 2006). As corn productivity is within the range of¶ the perennial grasses, differences in productivity cannot¶ explain the SOC loss in corn in contrast to the gain by¶ perennial grasses.

## Carbon Tax CP

### 1NC Shell

**The United States federal government should implement a phased carbon tax.**

#### Solves oil dependence and avoids politics

**Houser ’11** - Peterson Institute for International Economics (Trevor, American Eyes on Australia's Carbon Tax, PIIE, Op-ed in the Australian Financial Review

July 12, 2011, <http://www.iie.com/publications/opeds/oped.cfm?ResearchID=1873>)

A carbon tax has long been the favorite tool among economists for reducing greenhouse gas emissions. Imposing a tax on something that reduces welfare (like pollution) can allow policymakers to reduce taxes on things that increase welfare (like employment, investment or innovation). And it’s not just liberal economists that find a carbon tax attractive. Gregory Mankiw, Chairman of the Council of Economic Advisors under George W. Bush and Douglas Holtz-Eakin, senior economic advisor to Senator John McCain during the 2008 Presidential Campaign, have both argued the merits of taxing carbon and using the revenue to cut economically distorting corporate and payroll taxes. It’s the deficit reduction potential of a carbon tax that could give US climate policy a new lease on life. This economic logic has elicited support from some leading Republican politicians as well. Most notable is Senator Lisa Murkowski of Alaska (the highest ranking Senate Republican on energy policy issues) who, while opposing efforts by the Environmental Protection Agency to regulate greenhouse gas emissions, has publically supported a carbon tax. She is joined by ExxonMobil chief executive Rex Tillerson, who argues the economic certainty that comes with a carbon tax is more important than the environmental certainty you get with cap-and-trade. And for Americans increasingly concerned with the security of the country’s energy supply, a carbon tax could yield some unexpected benefits. A colleague and I recently analyzed all leading energy security proposals currently bouncing around Washington—from vehicle efficiency standards to expanded offshore oil drilling. And we threw a carbon tax in just for fun. To our surprise the carbon tax did more to reduce US dependence on foreign oil than almost any other proposal because it both reduced oil demand and increased domestic supply. The latter occurs thanks to a) an increase in natural gas liquids production, an oil substitute pumped alongside the natural gas used to replace coal-fired power plants, and b) CO2 captured from remaining coal-fired power plants used to coax more oil out of older domestic wells.

### 2NC Solvency – Laundry List

#### Solves climate change and economy – innovation

**Bland 7/2/12** – environmental engineer and staff writer for Western Advocate (Ashley, Good reasons for imposing carbon tax, Western Advocate, http://www.westernadvocate.com.au/news/local/news/general/good-reasons-for-imposing-carbon-tax/2608992.aspx?storypage=0)

IF you don’t accept that the extraction and burning of fossil fuels is having a negative impact on our planet then you might struggle reading this. However, I urge you to consider some other good reasons for putting a price on carbon. From an economic point of view, creating a “price signal” is a well-established way for governments to correct a “market failure”. What this means is that governments make the things they want to discourage more expensive, and the behaviours they want to encourage relatively cheaper. The market failure in this instance is that companies and individuals can pollute the atmosphere with carbon dioxide, other gasses and particulates from burning fossil fuels for free. The consequences of this affect all of us – go to the CSIRO website if you want details of how. In this instance the government is doing two things, it is providing a price signal and modest compensation. So, as consumers, we can choose to continue with our current buying patterns and hope we won’t be worse off, or adapt our buying patterns, by reducing our energy consumption for example, and potentially being slightly better off. But the carbon tax is not just about carbon; it’s also about challenging the level of consumerism that, combined with world population growth, is eroding the stability and resilience of our environment. If it didn’t involve so much money for the biggest corporations on the planet I suspect we would have made much more progress than we have. As individuals, we tend not to like change. As organisations, we strongly resist it. More than 97 per cent of scientists, and hence most nations, accept that it would be wise to limit carbon emissions. The question is, how do we fairly distribute the wealth that our carbon-built economy creates? Well ... one answer is to create wealth without using as much carbon. This is the elusive win-win for the environment and consumer capitalism that means humans get what they want; just not at the expense of other poor humans in far away countries or animals and plants that are rarely seen and whose significance is often misunderstood. Here are some reasons why the carbon tax is a good thing: The emotional reasons: The vast bulk of the population is concerned about the environment (78 per cent in the most recent NSW poll). Many people just think we’ve been pushing too hard for too long. They have seen changes in their local environment which they don’t like and they are glad to see the Government doing something about it with the support of scientists and economists. The values and beliefs reasons: Out of the 180 plus countries in the world, Australia consistently ranks in the top 20 for per capita income and quality of life. Of that 20, about 10 already have a price on carbon and the other 10 have become rich from either selling oil or manufacturing ‘stuff’. Perhaps it’s quite reasonable that the rich developed countries curb their consumption of non-renewable resources and leave some for other countries and future generations? The logical reasons: Endless growth is a nonsensical concept – it’s a measure of the increasing rate at which we are using up finite resources. Endless change is how the universe works. Which one do you think we should align ourselves with? Even if you are not worried about putting extra CO2, mercury, nitrous oxides, and other pollutants and cancer-causing hydrocarbon compounds just about everywhere into the atmosphere, consider that ABARE estimates we only have about 90 years of coal left at 2008 extraction rates. Surely the price is only rising for carbon-rich commodities. Shouldn’t we save some of this resource for future generations who may be able to use it in less polluting ways? Consider also that there are proven, viable alternative sources of energy and materials which consume significantly less carbon. Renewable energy technology is already challenging the carbon-hungry model. Once the purchase price of renewable energy generators is paid off (in a few years) for the rest of its life the plant provides essentially free energy! Imagine the competitive advantage to Australian businesses in those few years when their energy costs are small compared to competitors relying on carbon heavy energy. A carbon tax provides the incentive for these business to reject the existing, inefficient energy supply which is distorted by subsidies, has limited local control and pays profits to far-away shareholders. It’s part of the search for new ways of doing business that account for environmental impacts and, in so doing, minimise them. This is why the countries that met at the Rio Earth Summit last week were searching for new ways to achieve sustainable development – one that accounts for all the things that contribute to our wellbeing. Having a price on carbon is an essential first step in this quest.

### 2NC Solvency - Phased

#### A phased carbon tax is key

CTC ’11 (Carbon Tax Center, Charles Komanoff and Daniel Rosenblum launched the Carbon Tax Center (“CTC”) in January 2007 to give voice to Americans who believe that taxing emissions of carbon dioxide — the primary greenhouse gas — is imperative to reduce global warming. The two of us brought to CTC a combined six decades of experience in economics, law, public policy and social change. Though Dan has moved on, Charles remains as CTC director, while James Handley, a chemical engineer and attorney who previously worked in the private sector and for U.S. EPA, serves as our Washington D.C. rep, “FAQs” January 31st, <http://www.carbontax.org/faq/>)

While carbon taxes will need to be very high to create the required price incentives, they will need to be phased in to give individuals and businesses the opportunity to adjust. There is no magic formula or right number, but a tax that grows at an annual rate equivalent to 5-10% of the “baseline” cost of fossil fuels probably offers a viable combination of meaningful incentive and opportunity for adaptation. The $37 per ton of carbon “starter tax” mentioned earlier, equating to around 10 cents a gallon of gasoline, fits the lower end of that range. At least as important as the tax level is the commitment to keep raising the tax, so that energy-critical decisions, from car-buying (Hummer or Prius?) to home-buying (exurb or transit-oriented community?) to factory locating (highway interchange or rail line?), are made with carbon-appropriate price signals.

### 2NC Solvency – Oil Dependence

#### Carbon tax reduces oil consumption

**Stelzer ’11** - Senior Fellow and Director of Hudson Institute's economic policy studies group. Prior to joining Hudson Institute in 1998, Stelzer was resident scholar and director of regulatory policy studies at the American Enterprise Institute. He also is the U.S. economic and political columnist for The Sunday Times (London) and The Courier Mail (Australia), a contributing editor of The Weekly Standard, a member of the Advisory Board of The American Antitrust Institute and a member of the Visiting Committee of the Harris School of Public Policy Studies at the University of Chicago. (Irwin, Carbon Taxes: An Opportunity for Conservatives, Hudson Institute, March 2011, <http://www.hudson.org/files/publications/Stelzer%20Carbon%20Tax%20web.pdf>)

A tax on carbon, whether it takes the form of a levy on emissions, or a second-best substitute, a tax on gasoline, would accomplish a host of conservative goals. First, by reducing oil consumption it would reduce the security threat posed by the increasing possibility that crude oil reserves will fall under the control of those who would do us harm, either by cutting off supplies, as happened when American policy towards Israel displeased the Arab world, or by using the proceeds of their oil sales to fund the spread of radical Islam and attacks by jihadists. No one doubts that the execrable Hugo Chávez survives only because we pay millions for Venezuelan oil, or that Saudi funding of radical Islam is made possible in good part by our payments for the Kingdom’s oil. If we curtail our use of oil we reduce our overall imports and, thereby, the flow of funds that If the uproar in the Middle East tells us anything it is that dependence of oil from that region of the world is a security threat, now more than ever.

#### Carbon tax solves oil dependence and the economy

Sullivan ’09 - Washington correspondent of the The Commercial Appeal (Bartholomew, FedEx CEO: Tax carbon, end our dependence on foreign oil, Commercial Appeal, September 23rd, http://www.commercialappeal.com/news/2009/sep/23/fedex-ceo-smith-says-us-needs-end-dependence-forei/)

WASHINGTON -- FedEx CEO Frederick W. Smith made his case Wednesday for a tax on carbon, a reduction in the payroll tax and expensing of capital equipment, speaking at a panel discussion with other CEOs at the Council on Competitiveness National Energy Summit. Saying that ending the nation's dependence on foreign oil is more "enlightened self-interest" than a crusade, Smith noted that the Memphis-based logistic giant consumes 1.5 billion gallons of fuel a year. He called it a matter of both national and economic security. Smith said his work with the Energy Security Leadership Council with retired generals and admirals made him realize that "we're spending 600 and some odd billion dollars on national defense -- 50 to 60 cents of every dollar is directed to protect the oil trade." George A. David, chairman of United Technologies Corp., argued that more efficient building codes and standards and more investment in research and development are high priorities. He noted that the elevators his company makes use 25 percent of the energy they used to because they now recapture the energy of descent. Jonathan Lash, president of the World Resources Institute, made the case for pricing carbon and agreed with David that the free allowances in current cap and trade proposals are a mistake. John Krenicki Jr., CEO of GE Energy Infrastructure, said the U.S. came late to renewable energy compared to Europe. Smith took the opportunity in a question by moderator Richard M. Smith of Newsweek to argue that the tax code is prejudiced against capital investment. "If you want to make a blue-collar worker more productive and allow them to make more money, you have to invest in training, infrastructure and capital," Fred Smith said. "The reality is our tax code in the U.S. promotes financial speculation, leverage and private equity, and penalizes capital investment. With a stroke of a pen, the Congress could change the dynamics, and that would be to allow for the expensing of capital equipment." On the carbon tax, Smith said he prefers it to cap and trade because he suspects "an army of lobbyists" will be employed making exceptions to it so it becomes something like the 170,000-page tax code. A predictable, graduated tax would have an impact on the role of the military overseas, improve the environment and be good for the economy, Smith argued. When Richard Smith asked him how he could escape being called a socialist with his plan, Fred Smith recalled spending two years on one of the country's overseas "adventures" in Indochina. "If people want to call me a socialist for recognizing these huge costs -- externalities -- of our national defense, not to mention the 5,000 young men and women who have lost their lives in this thing and the thousands who have been maimed and wounded, we need to solve this problem," he said. "The failure to do it is not only going to create serious consequences in terms of our economy, but we're going to make a big mistake and get into a big conflagration over this thing," he predicted.

#### Solves oil dependence

EESI ’10 (Environmental and Energy Study Institute, Moving Away from Oil: Biofuels and Biobased Products, June 30th, http://www.eesi.org/moving-away-oil-biofuels-and-biobased-products-30-jun-2010)

The unfolding disaster in the Gulf of Mexico is rapidly adding to the already high price of our nation’s oil dependence. We need to find alternative, more sustainable ways to fuel our transportation systems, heat our homes, and create products and materials we use in daily living – for the sake of our health, our climate, our economy, our national security, and the fragile ecosystems upon which we depend. The first thing we can do as a nation is to enact policies that encourage all of us to use much less petroleum. Policies such as a carbon tax on fossil fuels, or a petroleum tax, or a declining cap on fossil carbon emissions would encourage us to make different choices – to use more efficient public or alternative transit, to live closer to where we work, to use more fuel efficient vehicles, to insulate homes that use heating oil, to reduce our consumption of products that are petroleum-intensive to make and deliver. These are all things that we can start doing today voluntarily (and some are), but because the price we pay for petroleum products does not reflect the true social and environmental costs of our oil dependence, relatively few people are making these choices. To get our country moving in the right direction, we need to begin charging the full price of our oil dependence. When the whole nation begins choosing to do these things together with resolve, we will see our oil dependence decline dramatically. And, we will see thousands more jobs being created in our communities as more of our energy dollars are invested and spent closer to home.

### 2NC Solvency - Warming

#### Carbon tax reduces emissions - solves global warming

**Applebaum ’07** - a columnist for the WASHINGTON POST and SLATE. She is also the Director of Political Studies at the Legatum Institute in London, where she runs projects on political and economic transition (Anne, Global Warming's Simple Remedy, The Washington Post, February 6th, http://www.washingtonpost.com/wp-dyn/content/article/2007/02/05/AR2007020501248.html)

But don't get me wrong: I was convinced by the reigning consensus on global warming a long time ago, have accepted that human use of fossil fuels has caused it and am very glad so many European politicians take the scientists' words seriously. The question now is whether these same Europeans will start taking the solutions seriously. If so, they must begin by abandoning the bankrupt Kyoto treaty on climate change and encouraging the United States to do so, too. The much-vaunted treaty creates a complicated and unenforceable system of international targets for carbon emissions reduction, based on measurements taken in 1990. Critics of the American president have condemned him for failing to sign it, conveniently forgetting that the Senate rejected it 95 to 0 in 1997, a margin that reflects broad bipartisan opposition. At the same time, few of the Asian and European signatories are actually on track to meet their goals; those that will meet the targets, such as Britain, can do so because their economies rely less on industry than they once did. Canada and Japan aren't even close to compliance; China and India, whose emissions rates are growing most rapidly, are exempt altogether as "developing" countries -- which, given their economic strength, is absurd. None of which is to say that reduction of carbon emissions is impossible. But the limiting of fossil fuels cannot be carried out with an unenforceable international regime, using complicated regulations that the United Nations does not have the staff or the mandate to supervise, with the help of a treaty that effectively penalizes those who bother to abide by it. I no longer believe that a complicated carbon trading regime -- in which industries trade emissions "credits" -- would work within the United States either: So much is at stake for so many industries that the legislative process to create it would be easily distorted by their various lobbies. Any lasting solutions will have to be extremely simple, and -- because of the cost implicit in reducing the use and emissions of fossil fuels -- will also have to benefit those countries that impose them in other ways. Fortunately, there is such a solution, one that is grippingly unoriginal, requires no special knowledge of economics and is easy for any country to implement. It's called a carbon tax, and it should be applied across the board to every industry that uses fossil fuels, every home or building with a heating system, every motorist, and every public transportation system. Immediately, it would produce a wealth of innovations to save fuel, as well as new incentives to conserve. More to the point, it would produce a big chunk of money that could be used for other things. Anyone for balancing the budget? Fixing Social Security for future generations? As a foreign policy side benefit, users of the tax would suddenly find themselves less dependent on Persian Gulf oil or Russian natural gas, too. Most of all, though, the successful use of carbon taxes does not require "American leadership," or a U.N. committee, or a complicated international effort of any kind. It can be done country by country: If the British environment minister or the German chancellor wants to go ahead with it tomorrow, nothing is preventing them. If a future American president wants to rally the nation around a patriotic and noble cause, then he or she has the perfect opportunity. If the Chinese see that such a tax has produced unexpected benefits in America and Europe, they'll follow. And when that happens, we'll know that the apocalyptic climate change rhetoric has finally been taken seriously.

#### Carbon tax is the most efficient way to slow warming

**Gardner ’08** – Energy and Environment Correspondent for Reuters (Timothy, Carbon tax seen as best way to slow global warming, Reuters, <http://www.reuters.com/article/2008/10/09/us-climate-finance-sachs-idUSTRE4988X020081009>)

Cap and trade has emerged as the dominant attempt to slow global warming. Global deals in permits to emit greenhouse gas emissions have hit nearly $65 billion a year. The European Union, under the Kyoto Protocol, has embraced cap and trade since 2005 and voluntary markets have developed in the United States, the developed world's top carbon polluter. But a straight carbon tax on energy production -- at an oil wellhead or refinery for instance -- would be simpler and cheaper than putting a cap on tens of thousands of polluters, Jeffrey Sachs, a special advisor to the U.N. secretary general and director of the Earth Institute at Columbia University told a panel on Thursday. As the world prepares to form a successor agreement to the Kyoto Protocol by the end of next year, focus is sharpening on how well cap and trade markets are fighting emissions. Carbon taxes would quickly cut emissions across all sectors of the economy, including vehicles and manufacturing, said Sachs. It could also be more efficient than spreading the trade of permits across the financial system. "Having a lot of people engineer financial instruments for carbon when there are much more direct ways to do this strikes me as not really a great investment," Sachs said. "I'm also not so keen on sending our best and brightest off to do more financial engineering," he said. "I think the kind of (financial) meltdown we have right is a little bit of an example of how we've taken a generation of young people and put them in tasks that don't really solve social problems." Yvo de Boer, the U.N. climate chief, told the panel he doubted voters in the United States and other countries would accept new taxes. Sachs admitted that the United States is "neurotic" about new taxes, but said they would be the best way to fund research and development and subsidies for big low-carbon energy projects such as nuclear plants and transmission systems to bring solar power from the Southwest and wind power from the Great Plains states to cities on the coasts. Sachs criticized one of the mainstays of climate trade that has developed in the European Union. Under the Kyoto Protocol the Clean Development Mechanism allows rich countries to offset their carbon footprints by investing in clean energy projects like small wind farms or hydroelectric dams in developing countries. "Things like the CDM are just unfortunately very marginal small tools that aren't going to change the broad framework of how energy is produced and how technology is developed and distributed," said Sachs. De Boer said the CDM has met its goals but that a range of tools could be developed to improve it. Investments could be widened, for instance, to improve whole sectors of developing countries, such as mass transit systems in large cities.

#### Carbon tax solves warming – reduced emissions and alt energy spinoffs

**Schlesinger ’05** - member of the National Academy of Sciences and dean of the Nicholas School of the Environment and Earth Sciences at Duke University (William H, Carbon Tax Provides Fairest Incentive For Curbing Global Warming , Duke Today, May 16th, 2005, <http://today.duke.edu/2005/05/carbontax.html>)

Anderson correctly recognizes that the emissions of carbon dioxide stem from many sectors of society -- from power plants and other industrial sources and from you and me, as we heat and light our houses and drive our cars on daily errands. No one sector can solve the global warming problem by itself. A carbon tax would be paid whenever a molecule of carbon dioxide is emitted to the atmosphere by burning fossil fuels. Utilities would pay it based on their smokestack emissions and pass the cost to consumers in their monthly electric bill. Each of us would pay it when we fill up with gasoline, based on the content of fossil carbon in the fuel. A carbon tax would provide the maximum incentive for bright engineers to improve the efficiency of fossil fuel use in all sectors of society. It also would maximize the potential for important "cross-sector" transfers of efficiency. For instance, if engineers find efficient ways to reduce CO2 emissions from the power plants that provide our electricity, the utilities' carbon tax savings could be passed along to consumers. The same principle might make it cheaper to operate an electric car than a gas-powered one. More of us would be motivated to buy electric cars, especially given the price of gasoline these days. A carbon tax does not necessarily mean a net increase in our cost of living. Carbon tax revenues could be directed to general government expenditures, so that income tax rates could be reduced for all Americans -- or perhaps those at the lower income levels. Importantly, our current income tax structure provides no personal choice to reduce our tax; indeed, the more we earn, the more we pay on April 15. A tax on carbon, which would show up in higher costs for electricity or gasoline, would provide an incentive for each of us to use energy more efficiently if we wanted to pay lower taxes. Still want an SUV? Buy it, but each year you'll pay more for gasoline than your neighbor who has a Toyota Prius. Want to live in the country? Fine, but remember it will cost you to drive the extra miles to work each day. Want to save some money at home and send less to the taxman? Put on a warm sweater and lower your thermostat. Conservation and efficiency must both play a role in our attempt to reduce dependence on dwindling production of foreign oil. A carbon tax provides an equal incentive for both pathways to be part of the solution. In the absence of a coherent federal energy policy, various efforts are emerging in individual states to limit carbon dioxide emissions. These are important first steps, but consider the simplicity of a national energy policy based on a carbon tax that would maintain a level playing field in the economic environment across this country. My suspicion is that a national carbon tax will be the easiest way for the United States to participate in international efforts to curb CO2 emissions. Without any national energy policy, the United States is rapidly losing an important role in the development of solar, wind and other alternative energies, like integrated gasification combined cycle. Also known as IGCC, this technology will allow power plants to make electricity from coal while capturing the carbon dioxide emissions that might otherwise lead to global warming. A carbon tax will make such energy sources competitive across this country, and spur new high-tech industries to develop them. We need to be the world's technology leader of the 21st century, not a stubborn follower of our old inefficient ways. Paul Anderson is right: keep it simple. A tax on fossil carbon emissions is the way to go.

### 2NC Solvency – Economy

#### Spurs economic growth – innovation and jobs

**Drape 6/28/12** – Australian associated press writer (Julian, Carbon tax will create green jobs: Milne, Australian News, http://www.theaustralian.com.au/news/breaking-news/carbon-tax-will-create-green-jobs-milne/story-fn3dxiwe-1226411123997)

GREENS leader Christine Milne says growth in the United States and Europe is being driven by the need to move away from oil to renewable energy and the carbon tax will ensure Australia isn't left behind. The "zero-carbon economy" will provide "big opportunities", she told AAP. Renewable energy includes wind, solar, thermal and wave power. The Climate Institute estimates the carbon tax could create up to 32,000 clean-energy jobs by 2030. Senator Milne said the carbon price wouldn't have become a reality without the minor party. "The Greens made it a key component of an agreement with the Gillard government in order to give it confidence and supply," she said. The Greens sank Kevin Rudd's carbon pollution reduction scheme in the Senate in 2009. Later they extracted an additional $10 billion "green bank" for renewable and low-emissions technologies under the 2011 clean energy future package and a much tougher 80 per cent reduction target by 2050. Senator Milne insist serious action is needed because the International Energy Agency has warned the world is on track for a six-degree increase in global temperatures. "That's planetary wipe-out," the Tasmania senator said ahead of the carbon tax starting on July 1. "So the sooner we can get going on this the cheaper it will be, the more innovative it will be and the more exciting it will be." Big business has argued the $23-a-tonne starting price is too high and $10 would be more in line with permits in the European Union's emissions trading scheme (ETS).

#### Carbon tax would spur economic growth and competitiveness

**McGee ’08** – political staff writer for The Irish Times (Harry, Carbon tax linked to economic growth, September 27th, 2008, http://meatthefacts.org/pdf/Irish\_Times\_27\_Sept\_08.pdf)

THE INTRODUCTION of a carbon tax could lead to economic growth and increasing competitiveness, according to a leading thinkthank on the environment. Comhar, the sustainable development council, yesterday called on the Government to introduce a carbon tax in the budget. It said the tax should be set at €20 per tonne of CO 2 emitted (or the equivalent of about Sc per litre of petrol). The average household would pay annual taxes of €246. In its pre-budget submission, Comhar contends that if revenues from the tax were used in targeted ways the result would be a growth in GNP, an increase in employment and investment in energy-efficient technologies. This would also lead to a reduction in fuel poverty. "The council believes that any revenues raised should be used to reduce labour tax, compensate lowincome groups and promote further emissions-savings activities." It says the proposed tax is approximately the same rate as the price currently facing industry under the EU Emission Trading Scheme (ETS). Comhar's director of research Dr Lisa Ryan said the immediate introduction of a tax would serve as a price signal that the cost of carbon would have to be met. "The incentive for introducing a carbon tax has been strengthened in recent times because of the economic downturn and the revelation that Ireland's carbon emissions from transport and agriculture are going to be far higher than previously expected over the next five years. "We need to act now to make sure we can meet our climate change targets. We also need to view the introduction of a carbon tax as an opportunity to stimulate our flagging economy," she said. Elsewhere, Labour's environment spokesman Joanna Tuffy yesterday called on the Government to quickly establish a national forum on climate change. Given the alarming rise being predicted in emissions, a forum would allow everyone with a stake in the issue to contribute to a solution. "It is time for Government, the public, local government, business, industry, farmers, the energy sector, the forestry sector and others to come together to decide what we can do more of - what we can do more efficiently - in order to make real progress on our carbon emissions."

#### Solves the economy – stimulus

**SCC ’10** (Stop Climate Change Initiative, EU carbon tax would spur green innovation and help realise climate goals, Stop Climate Change, http://www.stopclimatechange.net/Local%20Settings/fileadmin/bali/index.php?id=26&tx\_ttnews%5Bswords%5D=industry&tx\_ttnews%5Btt\_news%5D=1218&tx\_ttnews%5BbackPid%5D=40&cHash=add052d91debb2e194fcd0384f2b8ec5)

Clearly, the rate at which any carbon tax is set would be crucial to its effectiveness. If set at the right the level, a carbon tax should act as a stimulus for investing in cleaner and more efficient technologies to deliver actual emissions reductions. If it is too low, it will not. To this end it is worrying that one of the key arguments in the briefing is on the need to "harmonise" the carbon price signal in sectors not covered by the emissions trading scheme, with those in the emissions trading scheme. The current carbon price (c. €15/tonne) is proving far too low. As a result, it is cheaper for industries to buy additional emissions permits, rather than investing in cleaner and more efficient technologies that would deliver actual emissions reductions. If the starting rate for a carbon tax is based on the current carbon price it will be ineffective as a stimulus, it should therefore be set at a higher level. The recent communication from the Commission suggests that a carbon price of €30 per tonne of CO2 would be necessary if the EU were to deliver a 30% emissions reduction target by 2020. A number of EU governments already assume a shadow carbon price of over €40 per tonne of CO2 for 2020 - for example €42/tonne in the UK. However, achieving ambitious climate targets, in line with what the science demands, would probably require a higher rate: certainly more than €50/tonne of CO2 by 2020 (in the French debate on a carbon tax, experts estimated a price of €66/tonne). Another problem with the Commission's logic is its assumption that a carbon tax should only apply to sectors outside of the emissions trading scheme - in order to harmonise ETS and non-ETS sectors. There is no reason why a carbon tax shouldn't be applied to all economic sectors. If the goal is to stimulate green innovation and investment in low carbon technology, a carbon tax could be used as a complement in ETS sectors as well. As noted above, the current carbon price is far too low to act as a stimulus. Even if the EU succeeds in increasing its 2020 emissions reduction target (to a 30% EU target, which would imply a 36% reduction for ETS sectors), it is not clear that this will lead to a carbon price sufficient to stimulate investment in cleaner technologies due to other imbalances in the ETS (such as the banking of surplus permits - EUAs - and external emissions permits - CERs from the first two phases of the ETS). A carbon tax could help redress this.

### 2NC CP Popular (Politics NB)

#### Carbon tax is bipartisan

**Romm ’12** - Senior Fellow at American Progress, editor of climate progress, and holds a Ph.D. in physics from MIT (Joe, Bipartisan Support Grows for Carbon Price as Part of Debt Deal, Climate Progress, February 24th, http://thinkprogress.org/climate/2012/02/24/431830/bipartisan-support-carbon-price-debt-deal/)

At the end of this year, the United States will confront a trifecta of difficult fiscal challenges: The Bush tax cuts will be set to expire; the defense budget and spending on civilian programs will face a $110 billion sequester; and a new extension of the federal debt limit will be looming. At the same time, the evidence will be clearer than ever that urgent action is needed to protect our nation and the world from irreversible climate change. The overwhelming scientific consensus will have grown even stronger. And if 2011 is a harbinger of our future, record-breaking droughts and storms will have again afflicted our nation — at immense cost in lives and property damage. These fiscal and environmental problems may appear unrelated. But as a bipartisan group of current and former members of Congress, we want to propose a new idea: These seemingly intractable challenges are easier to address together than separately…. If budgeting is ultimately about choices, enacting a policy that reduces dangerous air pollution while providing hundreds of billions of dollars in debt relief should be a no-brainer. No other policy would do as much for our economy, our security and our future as putting a price on carbon. That’s the opening of a bipartisan Washington Post op-ed on how a price on carbon could immediately help America address two of its biggest long-term problems, global warming and the national debt. The authors: Democrats Henry A. Waxman and Edward J. Markey represent California’s 30th District and Massachusetts’s 7th District, respectively, in the House of Representatives. Republicans Sherwood Boehlert and Wayne Gilchrest formerly represented New York and Maryland districts, respectively, in the House. As I first reported last May, a “high and rising price for carbon pollution has emerged as a credible deficit reduction strategy.” Then in July, I pointed out, ”The only plausible scenario now for seriously addressing US greenhouse gas emissions in a way that would enable a global deal and give us some chance of averting catastrophic multiple, simultaneous climate impacts is for a serious carbon price to be part of the post-2012-election budget deal.” Now 4 members of Congress, 2 Ds and 2 Rs, have stated the obvious: Since higher revenues must be part of any grand bargain to address the debt, a price on pollution makes the most sense. And yes, Yes, I’m aware the two Republicans ain’t in Congress any more. Ya gotta start somewhere! Here is more of their argument: The best approach would be to use a market mechanism such as the sale of carbon allowances or a fee on carbon pollution to lower emissions and increase revenue. Using these policies, the United States could raise $200 billion or more over 10 years and trillions of dollars by 2050 while cutting carbon emissions by 17 percent by 2020 and 80 percent by 2050, providing transition assistance to affected industries, and supporting investments in clean-energy technologies. Such a policy would have enormous benefits beyond its fiscal contributions. As the National Research Council of the National Academy of Sciences concluded last year, “The risks associated with doing business as usual are a much greater concern than the risks associated with engaging in strong response efforts.” Inaction on climate means more intense and frequent heat waves, more droughts, more flooding and more loss of coastline. Delaying action just until the end of the decade will quadruple costs to the global economy, according to the International Energy Agency.

Republicans and Democrats support a carbon tax

Pethokoukis ’10 - Money & Politics columnist-blogger for the American Enterprise Institute (James, BP oil spill may fuel drive for carbon tax, June 3rd, 2010, Tax News, http://www.taxrates.cc/html/1006-carbon-tax.html)

Enter the carbon tax. One advantage is the possibility of significant Republican backing. It already has a smattering of support in Congress and from noted conservative intellectuals such as economists Arthur Laffer and Gregory Mankiw. Then there's its double dividend. First, a tax reduces emissions by creating a clear and certain price less subject to potential gaming by business. The downside is that it, like cap-and-trade, could also lower economic growth and employment by a "modest amount," according to the Congressional Budget Office. But a carbon tax can also be pro-growth. A US$100-per-ton levy would boost gas prices by US$1 a gallon (while also making coal and natural gas pricier) and eventually generate US$500-billion a year in new government revenue. Payroll or corporate taxes could then be lowered by an equal amount. On paper, this would be revenue neutral. But in reality it would amount to subbing a new tax on something Americans don't really want (carbon pollution) for old taxes on something it does want (work and investment.) Even a starter tax of US$15 a ton could allow a 30% cut in corporate taxes or a 10% reduction in payroll taxes. The result could be higher economic growth, which also leads to higher tax revenue. In 2011, U.S. President Barack Obama will likely face a far more Republican Congress. Joint agreement on a carbon tax today would salvage some political -- if not environmental and economic -- good from the catastrophe in the Gulf.

**Carbon tax generates political capital**

Gallegher et. al ’07 - Associate Professor of Energy and Environmental Policy at The Fletcher School, Tufts University. Gustavo Collantes, Senior Energy Advisor, State of Washington. Henry Lee, Director, Environment and Natural Resources Program; Lecturer in Public Policy, Harvard Kennedy School. John P. Holdren, senior advisor to President Barack Obama on science and technology issues Robert Frosch, American scientist, was the fifth Administrator of NASA from 1977–1981 during the Carter administration. (Kelly Sims, Policy Options for Reducing Oil Consumption and Greenhouse-Gas Emissions from the U. S. Transportation Sector, Harvard - Belfer Center for Science and International Affairs, July 27th, http://belfercenter.ksg.harvard.edu/files/policy\_options\_oil\_climate\_transport\_final.pdf)

Other advantages related to the revenues from carbon taxes are that they could be used to create political capital and that they help to reduce the costs of the overall policy. Goulder (1995) showed that when carbon tax revenues are used to finance costs in distortionary taxes (such as income taxes), the overall policy costs are significantly reduced. Carbon tax revenues could be used to provide income tax relief to the American tax payer, to buttress social welfare programs such as social security, to help U.S.-based industry and workers to make the transition to a lower-carbon industry, to support research, development, demonstration, and deployment of low-carbon technologies, and to support public transportation. The allocation of tax revenues is, of course, ultimately Congress’s decision. The potential tax revenue would be dependent on the level of the tax imposed, but for illustrative purposes, a 50 cent tax on gasoline and diesel would generate approximately $90 billion in the first year. 50

## Brazil CP Solvency

### Solvency

#### Brazil is interested in pushing sugarcane-based ethanol in Cuba

Sapp 12 (Meghan Sapp, an agricultural journalist and senior editor of Biofuel Digest, “CUBA: Brazil wants to help boost cane ethanol production”, Sugaronline, an industry trade magazine that supplies news, prices and information to the global sugar and ethanol industries, 9/4/12, http://www.sugaronline.com/website\_contents/view/1200004//HZ)

The Brazilian Government wants to encourage the production of ethanol from sugarcane in Cuba, which would transform the Caribbean country to the world third largest renewable fuel supplier, only after the U.S. and Brazil, according to Iran's PressTV. ¶ The idea is to build farmers markets, and therefore to ensure a distribution network to consolidate ethanol internationally as a "tradable commodity". ¶ It is expected that this measure along with Cuba's support can reduce the current extreme fragility of the sugar sector. Like Brazil, Havana in the 1970's produced large quantities of sugar cane, with an average of 8 million tonnes per year, but currently Cuba only produces 1.2 million tonnes. ¶ The Brazilian proposal was intensively discussed last week in Havana, including a meeting among the Minister of Development and Industry of Brazil, Fernando Pimentel, the Cuban Foreign Trade Minister Rodrigo Malmierca Diaz and President Raul Castro. ¶ The Brazilian President Dilma Rousseff is very exited about this commercial opportunity of expanding the sugar ethanol market, she believes that a country that had at one time 120 sugar mills, is ripe for improvement and growth of this particular business and it will result in great benefits to the Brazilian ethanol industry.

#### Brazil Solves Cuba’s sugar cane industry

Messina 12

[William, “U.S. Food and Agriculture Exports to Cuba: Progress, Problems, and Prospects,”Cuba in Transition, Vol 22, Association for the Study of the Cuban Economy, Aug. 4/2012, http://www.ascecuba.org/publications/proceedings/volume22/pdfs/messina.pdf]

Over the last few years Brazil has been expanding its¶ involvement and investment in Cuba and has come¶ to play an increasingly important role in many aspects of Cuba’s economy. Brazil is a major player on¶ the world stage for selected agricultural commodities¶ and will be a competitive supplier for some of Cuba’s¶ F&A import requirements. Beyond that, it can offer¶ technical assistance for a number of agricultural commodities, and it already has provided investment for¶ Cuba’s sugar industry as mentioned previously.¶ Investment is a critically important component for¶ any significant recovery of Cuba’s immense agricultural production potential, and Brazil is making clear¶ its intentions to expand its activities in sugar and other areas in Cuban agriculture (as well as in other sectors of Cuba’s economy). Of particular note is the¶ fact that Cuba recently adjusted its policies to allow¶ foreign participation in the sugar industry for the¶ first time since the 1959 revolution. In November¶ 2012, a subsidiary of the Brazilian firm Odebrecht¶ SA reportedly began management of the sugar mill¶ “5th of September” in Cienfuegos province,4¶ evidence¶ that Brazil is expanding its involvement in Cuba’s¶ sugar industry beyond field production into processing. ¶ At the recently concluded Havana International¶ Trade Fair (FIHAV 2012), the Director General of¶ APEX-Brazil (Brazil’s Trade and Investment Promotion Agency) Hipólito Rocha Gaspar publicly expressed Brazil’s interest in expanding its working relationships in Cuba:¶ Brazil is intent on accompanying Cuba in its development through joint work in major sectors with¶ great socioeconomic demand, such as agriculture¶ and cattle raising, public health, the scientific research centers west of Havana (with technological¶ transfers and purchase of products), education,¶ computer science, energy, public finance and tourism, among others...Brazil can contribute much to¶ Cuba, much technology, equipment, modern machinery. The priority will be agriculture, the field of¶ foods [Claro 2012].¶ Claro cites another APEX-Brazil source who indicated that Brazil may be interesting in building as many¶ as 10 new sugar processing facilities in the island. ¶ And Brazilian companies are not the only ones interested in investing in Cuba’s agricultural sector; a day¶ after the Odebrecht announcement, Havana Energy,¶ Ltd., a subsidiary of the British Esencia Group, announced a joint venture with the Cuban government¶ to build a $45 million biomass plant in Ciego de Avila province, with plans to build as many as four more¶ plants in Cuba [Frank 2012].

#### Cuba has already gotten the tech and know-how from Brazil

Center for Strategic and International Studies February 8, 2013 (CSIS, CSIS is a bipartisan, nonprofit organization headquartered in Washington, D.C. The Center’s 220 full-time staff and large network of affiliated scholars conduct research and analysis and develop policy initiatives that look to the future and anticipate change, Hemisphere Insider Vol. 3: Issue 1, February 8 2013 “Brazil-Cuba Partnership: Island Nation Could Become a Major Ethanol Producer” <http://csis.org/files/publication/130108_SJohnson_HemInsider.pdf>)

The Cuban sugar industry is about to a get a big lift after stagnating for ¶ almost a decade. According to news reports, the Compania de Obras en ¶ Infraestructura, a subsidiary of the Brazilian construction giant Odebrecht ¶ is gearing up to make a $60 million investment to begin managing Cuba’s 5 ¶ de Septiembre mill in Cienfuegos province. This is the first time since the ¶ 1959 revolution that the government in Havana has accepted foreign ¶ participation in this industry. However, what is more relevant for regional¶ energy security is that Brazilian technology and know-how in the ¶ production of ethanol will transform Cuba into an export platform for ¶ sugar-based ethanol, a major competitor with the U.S. corn-based variety. ¶ Having a source of inexpensive and cleaner ethanol close by could create ¶ significant competition for U.S. corn growers given the U.S. fuel mandates ¶ that require ethanol in America’s gasoline blends, with required amounts ¶ likely to increase over the next four years. While it will not be the reason ¶ that the United States ends its trade embargo with Cuba, energy security ¶ may be a factor in nudging domestic political deliberations forward. ¶ Growing availability of cane-based ethanol may also help supply the needs ¶ of energy deficient Caribbean and Central American states.

#### Brazil offers intelligence and capital

**Esteban 2012** (Israel, Esteban: Correspondent for Thompson Reuders. REUTERS: "Brazil to Breathe Life into Faded Cuban Sugar Sector." Thompson Reuters: The world’s source of information and intelligence for businesspeople. <http://www.reuters.com/article/2012/01/30/brazil-cuba-sugar-idAFL2E8CUA7620120130>.)

Cuba, where sugar once accounted for 90 percent of export earnings compared with under 5 percent last year, has drawn up plans to reorganize the industry and allow foreign investment for the first time since mills were nationalized. Its once-powerful Sugar Ministry was abolished last year, leaving it up to a new state-owned company to revamp the rusting industry, with many mills pre-dating the revolution and some built with capital provided by the Soviet Union**. Odebrecht would also produce ethanol from sugarcane as well as electricity from the biomass that is left over when the cane is crushed, according to the Brazilian sugar industry executive who is familiar with the details of the project. "Cuba is opening up the possibility of producing ethanol through energy generation and Odebrecht will build a distillery there," the executive said**, adding the project is similar to one Odebrecht is developing in Angola. That is a $258 million undertaking in partnership with Angola's Sonagol oil company to produce 260,000 tonnes of sugar, 30 million liters of ethanol and 45 megawatts of electricity. Large-scale ethanol production in Cuba has come up against opposition from former president Castro, a fierce critic of the use of edible crops as fuel. Some experts believe that with sufficient investment**, Cuba has the potential to become the world's No. 3 biofuel producer after the United States and Brazil**. Ron Soligo, economist at Rice University in Houston, Texas, and an expert on the Cuban sugar industry, calculates that the island could achieve ethanol output of 7.5 billion liters per year. Brazil, by comparison, produces roughly 20 billion liters. "But developing the ethanol sector in Cuba will take time, since most of the (cane-growing) land was abandoned for years," he said. **Brazil, the world's No. 2 ethanol producer, has offered technical assistance to Cuba to produce the biofuel from cane. "The subject is on the table. There are investments planned in sugar and there exists a possibility that at some time this will be taken on board by the ethanol industry**," a source at Brazil's foreign ministry told Reuters.

## K Links

### Neolib K-link

#### Neoliberal interaction with developing nations causes food shortages, destroys agricultural diversity, creates dependence, threatens ecological sustainability, and perpetuates poverty. Cuba needs to remain free from the vise of American corporations caused by lifting any part of the embargo.

Gonzalez 4’Carmen G. Gonzalez, Associate Professor, Seattle University School of Law. Journal: Transnational Law & Contemporary Problems, “SYMPOSIUM: WHITHER GOES CUBA? PROSPECTS FOR ECONOMIC & SOCIAL DEVELOPMENT PART II¶ OF II: Trade Liberalization, Food Security, and the Environment: The Neoliberal Threat to Sustainable Rural¶ Development,” Fall, 2004, DA: 7/2/2013

First, trade liberalization in the industrialized world is not sufficient to address the distortions and inequities caused¶ by the monopolization of agricultural markets by a handful of transnational corporations. For example, five¶ agrochemical companies currently control over sixty-five percent of the global pesticide market. Many of these¶ companies have merged with companies that produce seeds and fertilizers. These companies can extract monopolistic¶ prices for key agricultural inputs. A similar concentration of market power exists among the transnational corporations¶ that process and market agricultural output. These companies utilize their market power to dictate agricultural¶ commodity prices. Farmers are increasingly squeezed between the handful of transnational corporations that supply¶ inputs and the handful of transnational corporations that purchase their agricultural output. The monopolization of¶ agricultural trade by transnational agribusiness places developing country farmers at an enormous competitive¶ disadvantage and threatens to perpetuate poverty and hunger.

Second, trade liberalization impedes the economic diversification necessary to promote food security at the national level. Contrary to the free market prescriptions of the IMF, the World Bank, and the WTO, virtually all industrialized countries (including the United States, France, Germany, Japan, and the United Kingdom) relied on tariffs, subsidies, and other interventionist measures to industrialize. Most recently, the newly industrializing countries of South Korea,¶ Taiwan, and Singapore successfully industrialized their economies using a combination of tariffs, subsidies, and [\*426]¶ regulation of foreign investment. Trade liberalization deprives developing countries of the very tools used by¶ industrialized countries to diversify and industrialize their economies.

Finally, trade liberalization poses a threat to the biological diversity necessary to maintain healthy agroecosystems.¶ The elimination of U.S. and EU subsidies and import barriers is anticipated to increase crop specialization in the developing world in accordance with the dictates of global markets. This development would continue the erosion of¶ crop diversity and the displacement of sustainable agricultural production techniques by chemical-intensive¶ monocultures.

There is only one country in the western hemisphere that has emphatically rejected the neoliberal economic model and has promoted a nation-wide experiment in ecologically sustainable alternatives to export-oriented industrial agriculture. That country is Cuba. n12 From the colonial period until the early 1990s, Cuba, like many developing countries, was highly food insecure as a consequence of its dependence on one agricultural commodity (sugar) to generate the bulk of foreign exchange earnings and its reliance on imports to satisfy domestic food needs. n13 During¶ the first three decades of the revolution (1959-1989), the Cuban government embarked on an investment strategy¶ designed to produce large-scale, chemical-dependent, capital-intensive farms specializing in sugar cane and livestock.

Cuba's adoption of industrial agriculture resulted in serious ecological harm and little improvement in food security. When the collapse of the socialist trading bloc in 1990 plunged the Cuban economy into a state of crisis known as the Special Period in Peacetime, Cuba experienced severe shortages of food, fuel, and agricultural inputs. The Cuban government responded to the crisis by implementing a series of reforms (including diversification of the agricultural sector, production for the domestic market, and active promotion of organic and semi-organic techniques) that enhanced food security and promoted ecological sustainability. n17 These reforms have been hailed by some [\*427]¶ commentators as "unprecedented, with potentially enormous implications for other countries suffering from the¶ declining sustainability of conventional agricultural production."

Cuba's post-1990 economic experiment raises many questions of interest to developing countries caught in the vise of neoliberal economic policies. The transformation of Cuban agriculture was made possible by Cuba's relative economic isolation, including its exclusion from major international trade and financial institutions as a consequence of the U.S. economic embargo. When the U.S. embargo is lifted, Cuba will be faced with the difficult task of maintaining an autonomous development path in the face of intense pressure to adopt neoliberal reforms and to revert to the export-oriented industrial agricultural model. Cuba is therefore a superb vehicle for examining the ways in which global trade and financial institutions constrain the development options of small, trade-dependent developing countries and threaten food security and the environment.

An analysis of the historic roots and current status of export-oriented industrial agriculture in the developing world¶ through the lens of food security and ecological sustainability necessarily requires a definition of key terms. Part I¶ introduces the concept of food security and explains the key elements of ecological sustainability. Part II traces the¶ evolution of industrial agriculture in developing countries from the colonial period through the Green Revolution and¶ discusses some of the risks and benefits of biotechnology. Part III examines the ways in which the neoliberal economic¶ model imposed through trade agreements and structural adjustment programs reinforces export-oriented industrial¶ agriculture and compromises food security and ecological sustainability. Part IV shifts the focus to Cuba, describing the¶ evolution of industrial agriculture in Cuba and highlighting the innovative policies and practices adopted by the Cuban¶ government in the aftermath of the collapse of the socialist trading bloc. Part IV concludes with an assessment of the¶ potential impact of neoliberalism on the Cuban reforms. Finally, Part V argues that the neoliberal economic model is¶ inherently incompatible with food security and ecological sustainability.